1986

An analysis of the inland transportation systems for East Africa's external trade

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AN ANALYSIS OF THE INLAND TRANSPORTATION SYSTEMS FOR EAST AFRICA'S EXTERNAL TRADE

by

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A paper submitted to the Faculty of the World Maritime University in partial satisfaction of the requirements for the award of a

MASTER OF SCIENCE DEGREE

in

MARITIME SAFETY ADMINISTRATION (MARINE ENGINEERING)

The contents of this paper reflect my personal views and are not necessarily endorsed by the UNIVERSITY.

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August, 1986

To Rose and Mukenya

ABSTRACT

Five countries - Kenya, Tanzania, Uganda, Rwanda and Burundi - constitute what is known as the East African Region. Only Kenya and Tanzania are coastal states: the others are land-locked with the most practical routes to and from the sea being via Kenya or Tanzania. This paper examines the routes presently followed, and the modes of transport presently adopted, and demonstrates that they are not the most economical possible for the transit of external trade goods in bulk. It then proposes alternatives that would make greater use of the Region's inland waterways, including Lake Victoria which lies within the Region and is the second largest fresh water lake in the world.

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ACKNOWLEDGEMENTS

Any practitioner who undertakes a period of academic research into his discipline owes an immense debt to all those from whom he has learnt his craft. The author therefore wishes to thank all those individuals, firms and organizations who kindly provided data, or contributed in one way or another, directly or indirectly, to make this study possible.

The work described in this paper was carried out during the author's tenure of a two year studentship at the World Maritime University, sponsored by United Nations Development Programme (Fellowships Section) through the Kenya Government's Ministry of Transport and Communications. This is gratefully acknowledged.

In addition, the author is particularly indebted to Professor T. Balmer for his guidance in the final production of this paper, and to Ane Marie Bak Rasmussen for her kindness and patience in typing the manuscript.

Finally, many thanks are due to the author's wife and son for their forbearance and perseverance during the author's period of study in Sweden.

ABBREVIATIONS USED

AWO	American Water Operators
BKB	Bukoba
BUJA	Bujumbura
C	Central Corridor
CEPGL	Economic Community of the Great Lakes Countries
COLREG	International Regulations for Prevention of Collision at Sea, 1972
DSM	Dar es Salaam
DWT	Deadweight
EAC	East African Community (1967-77)
EAHC	East African Harbours Corporation (1969-77)
EARC	East African Railways Corporation (1967-77)
EARHC	East African Railways and Harbours Corporation (1948-1967)
GDP	Gross Domestic Product
GNP	Gross National Product
GRT	Gross Register Tonnage
ICD	Inland Container Depot
ICO	International Coffee Organization
IRF	International Road Federation
JNJA	Jinja
KGL	Kigali
KGM	Kigoma
KMP	Kampala
KPA	Kenya Ports Authority
KR	Kenya Railways Corporation
KSM	Kisumu
LDC	Least Developed Countries
MBSA	Mombasa
MSMA	Musoma
MZA	Mwanza
N	Northern Corridor
SOLAS	International Convention for the Safety of Life at Sea, 1974
STABEX	Scheme to Stabilize Export Earnings
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978
TAZARA	Tanzania - Zambia Railways Authority
TEU	Twenty Equivalent Unit f eet (container)
THA	Tanzania Harbours Authority
TNGA	Tanga
TRC	Tanzania Railways Corporation
URC	Uganda Railways Corporation

CHAPTER I

INTRODUCTION

The demand for commodity transportation services arises because of the different locations of production and eventual consumption. The basic needs of people are food, clothing and shelter but, to obtain these, other things are needed - including sources of energy, processing and manufacturing plants, and raw materials of various kinds. How to exchange the things that one has (exports) for the things that one needs (imports) is a basic problem: the answer to which lies in transportation. It follows, therefore, that the creation of an effective and efficient transportation system, in minimum time, is a worthy and primary goal for every developing country. This must include seaports for external trade with other nations but equally, and perhaps even more importantly, it must include an efficient system of inland transportation which utilises all available resources.

The countries of the East African Region, namely Kenya, Tanzania, Uganda, Rwanda and Burundi, have road and inland waterway transport systems, but only the first three of these countries also have railway systems

and only the first two have direct access to the sea by virtue of being coastal States. Kenya, Uganda and Tanzania have direct access to Lake Victoria which, having an area of 68,423 square kilometers, is the largest lake in Africa and is second only to Lake Superior as the largest fresh water lake in the world. Inland water transport on this lake does exist but is not well-developed.

A major obstacle to the economic growth of the land-locked countries of Uganda, Rwanda and Burundi is lack of efficient routes to the sea - with resulting high inland transportation costs of imports and exports. Owing to inadequate transport facilities on Lake Victoria, transit cargoes to and from these countries go around the lake by road, as can be seen from Figure 1. The main exports of these countries are agricultural products and, if such commodities are to be competitive in the world market, the cost of their inland transportation (which ranges at present between 8% and 15% of the total value of the goods) must be kept as low as possible. This can only be accomplished by the exploitation and improvement of available facilities in totality and the attainment of efficiency in both operation and maintenance.

The development of inland waterways is often the

cheapest and quickest way of effecting the movement of bulk goods within a country. North America provides a good example of the importance of a water transport system. Its industrial growth was promoted and stimulated by the development of its waterways and harbours. Trading centres grew up where raw materials could be received and from where finished products could be shipped.

This study investigates how the inland waterways of Lake Victoria could be integrated with the road and rail systems serving Uganda, Rwanda and Burundi as a means of shortening the transit distances of goods to and from the coast - thus minimising transportation costs. The investigation begins with a discussion on the economy, foreign trade and internal communications of each of the five countries concerned. It then continues with an examination of the past, present and likely future inland transportation systems in the region, and how they are linked. Since the absence of adequate seaport facilities can be a major deterrent to national and regional economic growth, and seaports act as nodes in the transportation chains between hinterland and sea, the role of the East African seaports is then considered. The investigation proceeds with a general survey of the economic aspects of roads, railways and waterways of the world: drawing comparisons of their efficiencies

and transportation costs, and considering the factors influencing user choice and modal split. An evaluation and comparison of the various alternative routes, modes of transport and distances to the sea from the land-locked countries are then given, with estimates of transportation costs per tonne of cargo carried on each route for each type of export and import commodity selected. The paper is completed by a summary of the conclusions reached, and a list of the recommendations offered as a result of their consideration.

CHAPTER II

ECONOMY, TRADE AND INTERNAL COMMUNICATIONS OF THE EAST AFRICAN COUNTRIES

2.1 Geographical Location and Topography

The term "East Africa" as a political region refers to that region which used to be known as "British East Africa". This region lies across the equator and consists chiefly of the territories of Kenya, Uganda and Tanzania. In addition, the territories of Rwanda and Burundi lie on the part of the East African plateau and are thus included in the East African countries as shown in Figure 1.

The total area of these countries is 1,820,770 sq.km and, as at 1982, the total population was 61.2 million (see table 1). Since the whole region lies across the equator, climates are equatorial or tropical in character. Another notable feature of this region is that it forms part of the Eastern and Western Great Rift Valley which is part of the geological fracture that can be traced from Syria through the Red Sea and East Africa to Mozambique. All the lakes in the region such as Victoria, Malawi, Kivu, Albert, Turkana and Tanganyika

were formed due to the volcanic eruption of the Great Rift Valley.

2.2 Kenya

Kenya, whose capital city is Nairobi and main seaport Mombasa, had a population of 18.1 million in 1982, and a birth rate of 4% per annum said to be the highest in the world. The income per capita (table 1) in 1982 was US$ 390 and this has been declining because the population growth rate is higher than the gross domestic product growth rate.

Agriculture forms the main basis of Kenya's economy and source of income of the majority of the people (both subsistance as well as foreign exchange earnings) though service and manufacturing industries are becoming substantially important. Unlike many other less developed countries in Africa, Kenya produces a wide variety of cash crops which helps to make its economy less vulnerable to fluctuations in export prices.

The principal cash crops are coffee, tea, cotton, cashew nuts and pyrethrum. Coffee is the leading export crop and also the main foreign exchange earner followed by tea. Fig. 3 shows a graph of annual quantity of coffee exported between 1970-82 and Fig. 5 shows a similar

graph for tea. It can be seen from Fig.3 that coffee exports has risen from 54,000 tonnes to 98,000 tonnes over the same period. Fluctuations in world prices of these two commodities as well as output production have a profound effect on the country's whole economy.

The major import items in terms of value are mineral fuels and lubricants which account for about 37% of the total annual import bill, followed by machinery and transport equipment. Table 2 shows the annual total value of all merchandise trade for the period 1973-82 in US dollars. From this table, it can be observed that Kenya, just as the neighbouring countries, records a trade deficit every year.

Most of the agricultural crops (see Fig.2) are grown about 700 kilometres away from the main seaport of Mombasa and therefore need inland transportation to the port by either rail, road or otherwise. Over 90% of Kenyan tea for export is now containerised (1) and similar efforts are being made for coffee. There is need now to develop adequate infrastructure to cope with this change.

Internal Communications in Kenya

Kenya's extensive transport system includes road, rail,

inland water, coastal shipping and air. The total road network has a length of about 55,000 km. The railway line (Fig.1) runs from the main seaport of Mombasa through Western Kenya, and on to points in Tanzania and Uganda. Mombasa is also the outlet to the sea for the land-locked countries of Uganda, Rwanda and Burundi whose transit routes (Appendix I (2)) include Kenya's transport network.

Kenya Airways has operated its own international and domestic services since the break up of the East African Airways in 1977. There are two international airports: one at Nairobi and one at Mombasa. Other airports for domestic flights are at Kisumu and Malindi.

There are also some inland waterways transportation services operated by Kenya Railways Corporation on Lake Victoria. The main port on this lake is Kisumu which has a train ferry terminal. Other minor ports include Homa Bay, Mbita, Sena and Karungu. More about transport and communications will be discussed in chapters III and IV.

2.3 Uganda

Uganda is a land-locked country whose outlet to the sea is either through Kenya or Tanzania. The capital city

is Kampala and, in 1982, Uganda had a population of 13.5 million (table 1) with income per capita of US $ 230. The area of the country is 241,140 sq. kilometres and agriculture is by far the most important sector of the economy.

Agriculture accounts for about 97% of export earnings, 56% of the gross domestic product, and provides a livelihood for nearly 90% of Uganda's labour force (2). The development of the whole economy is therefore very much influenced by the performance of the agricultural sector. Output of cash crops fell during the period 1971-80 due to political upheavals (see Figs.3, 4 and 5) which led to farmers reverting to subsistance agriculture. A three year rehabilitation for the agricultural started in 1983 and is a priority in the Government's recovery programme.

Coffee is, by far the most important export crop, followed by tea and cotton. Figures 3, 4 and 5 illustrate the annual quantity of exports for coffee, cotton and tea respectively during the period 1970-82. From these figures, it can be seen that coffee exports fell from the peak of 224,000 tonnes in 1973 to 172,000 tonnes in 1982 having recorded the lowest figure of 90,000 tonnes in 1980. Cotton exports fell from the peak of 78,000 tonnes in 1970 to 2,000 tonnes in 1982 and tea exports

fell from 21,000 tonnes in 1972 to barely 1,000 tonnes in 1982. If the Government's agricultural rehabilitation programme is implemented there is evidence that the country is capable of raising these export quantities given political stability. Currently, Uganda's yearly coffee production exceeds its International Coffee Organization (ICO) quota allocation.

The major import item in terms of value is machinery and transport equipment which accounts for about 45% of the total import value. Table 2 shows the annual total value of exports and imports of all merchandise trade for the period 1973-82 in US dollars. It can be seen from this table that, of all the five East African countries, it is only Uganda that records a trade surplus.

At present, most of the export commodities from Uganda are moved by trucks to Mombasa by road but the Government's transport policy centres on transfer of long-distance freight traffic, including coffee, from road to rail (see section 3.1.3). During 1983/84, some of the coffee was taken through Tanzania, via inland waterways on Lake Victoria.

Internal Communications in Uganda

Uganda has 27,540 km of roads, of which 7,000 km forms the main roads. The main rail line (Fig.1) runs from Tororo in the East through Jinja and Kampala to Kasese. The Northwest line runs from Tororo to Arua. Eastward from Tororo, the line crosses into Kenya to form part of the Northern Corridor (Appendix I) linking Uganda and other land-locked countries of the region with the Indian Ocean seaport of Mombasa. There is a road connecting Rwanda and Burundi from Kampala via Mbarara.

There exists marine services on the inland waterways of Lake Victoria operated by Uganda Railways. The major ports of Uganda on this lake are Jinja, Port Bell and Entebbe. The latter is also the only international airport in Uganda used by the national carrier Uganda Airways and other foreign airlines.

2.4 Tanzania

Tanzania whose capital city and main seaport is Dar es Salaam is one of the world's 25 Least Developed Countries (LDC). It had a population of 19.8 million in 1982 and a GNP per capita income of US $ 280. According to World Bank estimates (table 1) the birth rate recorded in 1982 was 3.25% per annum which is high by world

standards. The country has an area of 945,090 square kilometres making it the biggest of the East African countries.

The agricultural sector is the mainstay of Tanzania's economy, accounting for 80% of export earnings, and providing a livelihood for 90% of the economically active population. The main problems that affect the agricultural sector are: high cost of imported machinery, fuel and other inputs, chronic lack of foreign exchange, and inadequate storage and transport facilities. The manufacturing sector is relatively small and accounted for only 5.8% of GDP in 1981.

Like most developing countries, Tanzania is mainly an exporter of raw materials and an importer of manufactured products. The leading export items are coffee (33% of export earnings), cotton, cashew nuts, tea, diamonds, tobacco and pyrethrum. Figures 3, 4 and 5 show annual variations of export quantities of coffee, cotton and tea respectively for the period 1970-82. The relative position of the various export products has varied over the years. For example sisal accounted for 26% in 1962, but only 6% by 1978. Coffee's share was 11% in 1962 and about 30% by 1981. Cotton's share is usually 10% - 12%.

Imports of crude petroleum and petroleum products in 1982 accounted for nearly 33% of the total import bill and took up 60% of foreign exchange earnings compared with 10% in 1972. The bulk of other imports includes transport equipment and machinery. Total annual value of exports and imports of all merchandise trade for the period 1973-82 is as shown in table 2.

Internal Communications in Tanzania

The concentration of Tanzania's population on the periphery of the country, leaving central part relatively sparsely populated, poses enormous transport and communication problems. This is because most of the roads connecting Dar es Salaam with the centres of population concentration become almost impassable during wet seasons. The most reliable means of moving goods and people have therefore been the railway line; inland waterways in the case of Lakes Victoria, Tanganyika and Malawi areas, and coastal shipping in the case of Southern Tanzania.

The total road network is around 54,000 km, 5% of which is paved. The central railway line (Fig.1) extends from Dar es Salaam to Kigoma on Lake Tanganyika with main branch line from Tabora to Mwanza on Lake Victoria. The Northern line joins the Tanga - Moshi - Arusha line at

Tanga from Dar es Salaam. This railway system forms part of the Central Corridor (Appendix III) and is operated by Tanzania Railways Corporation (TRC). There is also TAZARA railway from Dar es Salaam southwards to Zambia and is operated by Tanzania-Zambia Railways Authority.

The principal seaports on the main land are Dar es Salaam, Tanga, Mtwara and Lindi. The first two ports also handle cargo for the land-locked countries of Uganda, Rwanda, Burundi, Zaire and Zambia.

Inland waterways transport on the lakes is operated by Tanzania Railways Marine Services.

2.5 Rwanda

Rwanda is a land-locked country with Kigali as its capital city. It has an area of 26,340 square kilometres and in 1982, it had a population of 5.5 million (table 1) and GNP per capita income of US$ 260. The two main physical handicaps to its economic growth are extreme population density (the most densely populated country in the African continent) and the distance from the sea. The population problem is aggravated by high rate of growth which puts an increasing strain on food resources.

The agricultural sector accounts for 45% of Rwanda's GNP, and about 95% of the total value of agricultural production is accounted for by subsistence crops. In terms of foreign exchange earnings, coffee is the most important export crop, accounting for about 60% of total export value, followed by tin and tungsten ores 20% and then tea. The graph on Fig.3 shows that coffee exports rose from 14,000 tonnes in 1970 to 27,000 tonnes in 1982 having hit a peak of 37,000 tonnes in 1976 and 1979. A rise in exports of tea is also illustrated in Fig.5 from a quantity of 1,000 tonnes in 1970 to 7,ooo tonnes in 1982.

Rwanda's main imports in terms of total value are: Machinery, tools and transport equipment 27%; food 15% and then petroleum products and lubricants ranking third with 10%. The total annual value of exports and imports of all merchandise trade in US dollars for the period 1973-82 is shown in table 2.

Like other poor land-locked countries, Rwanda suffers from the low proportion of exports to industrialized countries and high proportions to the developing countries, and the small share of merchandise in total imports, are closely linked to the basic problem of high transportation costs (3). Currently, 85% of Rwanda's exports are taken by road to Mombasa through the North-

ern Corridor transit route (Appendix I) and the remaining percentage goes through Dar es Salaam port. The Central Corridor route would be geographically more logical for Rwanda if implemented, taking traffic south of Lake Victoria to link with existing and proposed (see appendix III) rail routes to Dar es Salaam.

Internal Communications in Rwanda

Rwanda has no railway line but with a 6,720 km network of road in 1982, it has one of the most intensive systems in all of Africa (4) though only 7% are paved. Five principal roads connect Kigali the capital city to other Rwandese cities. The major handicap is that most roads become impassable during the rainy season and there are also few bridges. The most important roads for Rwanda's external trade run from Kigali (Fig.1) through to Kampala in Uganda to join the Northern Corridor transit route. There exists also some inland waterways traffic on Lake Kivu to Zaire from Gisenyi, Kibuye and Cyangungu.

Rwanda, Burundi, and Zaire are members of Economic Community of the Great Lakes Countries (CEPGL). The Kagera Basin Authority, whose membership comprise Burundi, Rwanda, Tanzania and Uganda, has proposed a new rail network to link all the four countries. Feasibility

studies have been completed (5) and the intention is to link the Kagera region to the former East African Railway System at Bihangu on the Kasese-Kampala line which forms part of the Northern Corridor. Another connection is planned at Bukoba/Kemondo Bay Wagon Ferry on Lake Victoria. A third proposed link will connect Burundi into the Kigoma-Dar es Salaam link at Uvinza to form part of the Central Corridor. Under the same proposals, the road from Kigali to the Tanzanian border would be improved, with a new rail link from there to Bukoba/Kemondo Bay where goods would be ferried on Lake Victoria to Kisumu and linked with the Kenyan Railway system to Mombasa.

2.6 Burundi

Bujumbura is the capital of Burundi as well as the main port on Lake Tanganyika. Burundi is not only one of the land-locked countries but also one of the poorest in the world. With an area of 27,830 square kilometres, it had a population of 4.3 million in 1982 (table 1) and a GNP per capita income of US$ 280. Burundi is one of the 38 countries defined by the Lome Convention as Least Developed (LDC) and therefore qualifying for special treatment under the dependence, activation and replenishment provisions of that Convention's scheme to stabilize export earnings (STABEX) for products sold to

the EEC (2). In terms of population density (158 persons/sq.km), Burundi ranks second highest in mainland Africa after Rwanda.

Same as the other countries of the region, Burundi's economy is based on agricultural produce. There is little industry apart from processing of agricultural products, and manufacturing accounts for less than 10% of GNP. In the past, the overwhelming dependence on coffee (more than 90% of total export earnings in 1981) caused difficulties with the balance of payments in times of falling world prices. Other exports in order of foreign exchange earnings are cotton, minerals and tea respectively. From Fig.3, it is shown that annual export quantity of coffee increased from 20,000 tonnes in 1970 to 30,000 tonnes in 1982. But for tea (Fig.5) the annual quantity doubled from 1,000 tonnes in 1973 to 2,000 in 1982. Oil imports take about 45% of coffee export earnings. During 1983, the price of oil in Burundi reached US$ 100 per barrel, a reflection of high transportation to the land-locked state. Lack of efficient routes to the sea for external trade is a problem to Burundi's economy. Table 2 shows the annual total of exports and imports value of all merchandise trade for the period 1973 to 1982.

Internal Communications in Burundi

It was mentioned in the previous section that a great hindrance to Burundi's economic development is lack of adequate transportation facilities. There are no railroads. The total network of roads is dense for its size, but only 200 km of the 5,000 km of routes are made of asphalt. There is a main road (Fig.1) that connects Bujumbura to Kigali in Rwanda for the Northern Corridor.

Inland waterways of Lake Tanganyika play a crucial role in Burundi's transport system since most of the country's external trade is conducted along the lake between Bujumbura, Tanzania and Zaire. Geographically, Burundi's quickest and therefore most economic route is via Tanzania and the port of Dar es Salaam (Tables 13 and 14). But due to serious bottlenecks both at Kigoma port on Lake Tanganyika and at Dar es Salaam which is chronically congested, the country has been forced to use the longer, more expensive, but more efficient Mombasa outlet. This factor contributed to Burundi being a signatory to the Northern Corridor Transit Agreement in 1985 (Appendix I).

As a member of the Kagera Basin Authority, Burundi has equal interests along with Rwanda and Tanzania to improve the proposed Central Corridor (section 2.5).

CHAPTER III

TRANSPORT AND COMMUNICATION LINKS IN EAST AFRICA

3.1 Rail Transportation

3.1.1 Historical Background

In order to understand the present railway transport network structure in East Africa, it is necessary to briefly examine its historical development. During the colonial era, railways were built inland from the three main Indian Ocean seaports: Mombasa (1896), Tanga (1893) and Dar es Salaam (1905), each linking the coast with specific inland destinations (7). Fig.1 shows the connection of the hinterland to the seaports by rail.

Some of the areas through which the railways passed quickly developed their own economic base due to the presence of the railways from the beginning of the twentieth century. Branch lines were later built to serve areas of export production or cash crops (Fig.2).

After the British gained the mandate of Tanganyika, with a protectorate in Uganda and a colony in Kenya, the

whole of East Africa was now under their control. A Commission appointed in 1924 recommended, among other things, that there was a strong need for a united control of the railways, harbours and inland water transport systems in East Africa. This recommendation was not implemented until 1948 when the amalgamation of the railways and port services of the three territories took place (8). It became known as the East African Railways and Harbours Corporation (EARHC) and provided within the territories a coordinated transport system of rail and inland water transport services, harbour facilities and coastal transport services.

In 1967, the independent countries of Kenya, Uganda and Tanzania signed a treaty for East African cooperation, setting up the East African Community (EAC). The provisions of this treaty represented a set of compromises between the partner states in various aspects such as common services in transport, posts and telecommunications, customs union and a common market. After establishment of the EAC, the EARHC was split into two statutory corporations: the East African Railways Corporation (EARC) and the East African Harbours Corporation (EAHC). The EAHC provided a coordinated system of harbours and facilities related thereto and, as such, had a duty to maintain, operate and regulate the major ports of Mombasa, Dar es Salaam and Tanga in addition to all

the smaller ports on the East African coast (9). Whereas the East African Railways Corporation provided a coordinated and integrated system within the three territories of: rail and inland waterways transport services, port facilities in relation to the inland waterways transport services, and auxiliary road services in connection therewith.

Although this integrated EARC transport system worked quite well, the implementation of the EAC treaty provisions as a whole had its difficulties and complications, culminating with the break up of the East African Community in 1977.

The break up of the Community was, and is still, a sad experience particularly as far as the transport sector is concerned since it was designed to work as an integrated system. The result was that each state had to establish its own statutory relevant corporation, thus the East African Harbours Corporation was split into: Kenya Ports Authority (KPA) and Tanzania Harbours Authority (THA). The East African Railways Corporation was split into three so that each state was responsible for its own railways: Kenya Railways Corporation (KR), Tanzania Railways Corporation (TRC), and Uganda Railways Corporation (URC).

3.1.2 Kenya Railways Corporation (KR)

Formed in 1977, KR maintains and operates all rail services just as the EARC used to do except that these services are now limited to Kenyan territory as per Kenya Railways Act of 1978. The main railway line (Figure 1) is between the seaport of Mombasa, through the capital city of Nairobi and the Ugandan border (Malaba near Tororo), a distance of 1,085 km on the Northern Corridor. The other notable branch on this main line is from Nakuru to the Lake Victoria port at Kisumu.

Kenya Railways carry around 4 million tonnes of goods and 2.3 million passengers yearly on a total network of 2,650 km.

In 1985, the Railways' contribution to the transport sector in terms of GDP was reported (10) at below 15% compared to 25% by roads. Almost 50% of all freight traffic was carried by road in 1983/84 due to the stronger user preference for, and flexibility displayed by road transport. It is, however, the Government's policy in the Development Plan 1984-88 to try and route long distance freight by rail instead of road due to high maintenance costs for the roads.

Faced with stiff competition from long distance road

hauliers, Kenya Railways has introduced a series of new measures to attract more traffic, such as: Reduction of tariffs and rates, purchase of new cargo wagons, replacement of steam powered engines with diesels, up grading of the workshops for maintenance of the rolling stock, introduction of a computerised management system, and re-launching of the rail-wagon ferry on Lake Victoria within the Northern Corridor transportation system (see Appendix IV).

The opening of an inland contained depot (ICD) in Nairobi in 1984, to serve Mombasa port, led to introduction of a unit train concept called "Railtainer" by Kenya Railways (11). Two trains a day operate between Mombasa and Nairobi, six days a week, each capable of hauling 50 wagons with a total capacity of 100 TEU per train. This journey on a distance of 540 km takes approximately 16 hours and is regarded for all purposes and intents, as an extension of the ship voyage. Statistics have however shown that utilization of this service is still below optimum, though plans are being considered to extend the service to other places such as Malaba, Eldoret and Kisumu, subject to construction of inland container depots in these places to facilitate transit traffic.

Kenya Railways also operates inland water transport on

Lake Victoria. The rolling stock of KR is 209 diesel locomotives, 543 passenger coaches and 6,536 freight cargo wagons of various types.

3.1.3 Uganda Railways Corporation (URC)

After the break up of the EARC in 1977, the URC was established with some dilapidated rolling stock and old steam locomotives. The Uganda Government had therefore to start building up the resources of URC in terms of rolling stock, maintenance workshops, signalling and communication equipment and lake rail-wagon ferries. In 1984 when assets of the defunct EAC were finally divided, 672 of the defunct EARC's rolling stock were transferred from Kenya Railways to Uganda Railways.

The main railway track of URC runs from Kasese in the south west through Kampala (Fig.1) and Jinja to Tororo, and finally crosses into Kenya at Malaba (Northern Corridor). The Central Corridor route runs from Kampala to the Lake Victoria port of Jinja (Appendix III). URC carries about 0.7 million tonnes of freight annually on a total track length of 1,250 km.

According to the Uganda Government Revised Recovery Programme (12), it is stated that "increasing the proportion of long distance freight traffic carried by rail

is an urgent priority. This will provide savings in transport, road maintenance costs and allow significant fuel savings". Contrary to this policy, most of Uganda's external trade on the Northern Corridor is still moving by road. The main reasons why URC has been slow in implementing the Government's policy are:

- Lack of sufficient container wagons and inland container depots since most of the external trade (coffee) is now containerised,
- inability to monitor and control turn round of wagons within URC and on return of URC wagons from either TRC or KR, and
- pressure groups from parastatal organizations and private firms who have already invested in long distance trucks.

To overcome the above shortcomings, the URC has embarked on projects that include, among others, procurement of rolling stock and mechanical handling equipment, improvement of terminals and rehabilitation of the marine services on Lake Victoria.

Another feasibility study on Uganda containerisation (13) highly recommended the setting up of inland container depots in Kampala, Tororo and Kasese. This may help URC to carry more export commodities like coffee which is now containerised on both Northern and Central Corridor routes. For the latter route, there exists a memo-

randum of understanding between Tanzania Railways Corporation and Uganda Railways Corporation since June 1982 covering both rail and inland waterways services on Lake Victoria.

3.1.4 Tanzania Railways Corporation (TRC)

As a statutory body established in 1977 after the break up of EARC, TRC operates all domestic services and carries around 1 million tonnes of goods annually on a total track of 2,595 km. Description of TRC railway line was given in section 2.4 and is also shown in Fig.1.

Due to the poor road network in Tanzania, the railways play a key role in transportation of both goods and passengers. Transit cargo for Burundi, Rwanda and Zaire are carried by TRC to Kigoma on Lake Tanganyika. According to the memorandum of understanding between TRC and URC, the line from Dar es Salaam - Tabora to Mwanza forms part of the Central Corridor route for Uganda's transit cargo using the port of Dar es Salaam. The inland water transport on Lakes Victoria, Tanganyika and Malawi is operated by TRC and is discussed in chapter IV.

A recent Canadian funded study (14) showed that there is a considerable unutilised line capacity on TRC due to the following problems among others: Shortage of wagons

(especially container wagons with twist locks and tank wagons); poor locomotive and wagon availability (45% and 65% respectively); shortage of spares, lack of schedule equipment maintenance and skilled workforce; and poor station to station communication.

To overcome the above problems, the study recommended a number of long term organizational changes such as: management changes and staff training, procurement of wagons and locomotives, tariff increases, relaying of track and its maintenance, and purchase of spares.

Given the fact that the poor road system in Tanzania places heavy reliability on rail transportation, and that TRC also transports transit cargo for the land-locked countries, the improvements and efficiency of TRC's operations are of paramount importance. The rolling stock of TRC is composed of 108 diesel locomotives, 64 steam locomotives and 3,840 freight wagons of various types.

3.1.5 Tanzania - Zambia Railways Authority (TAZARA)

This railway track was built jointly by the Tanzanian and Zambian Governments, with assistance from China, and became operative in 1976. The management and operation of this railway is entirely separate from that of

TRC and even the two tracks are of different gauges. The TAZARA track has a total length of 1,857 km, of which 962 km is in Tanzania. This line runs from the seaport of Dar es Salaam (Fig.1) southwards through Mbeya to the Zambian town of Kapiri Moshi where it joins the Zambian track to Lusaka or Ndola. The main purpose for construction of this track was to enable Zambia's copper exports to reach international markets through shipping.

3.2 Road Transportation

Countries like Rwanda and Burundi do not have railways and therefore have to depend mostly on road transport for both internal and external communications, and little on inland waterways on Lakes Tanganyika and Kivu. Details on internal road network for each country has been discussed in chapter II.

The most important road route in terms of East Africa's inland transportation of external trade is that of the Northern Corridor (Appendix I (2)) from Mombasa through Nairobi to Kampala in Uganda, Kigali in Rwanda, and finally to Bujumbura in Burundi.

Though the railway line runs parallel to above route from Mombasa to Kampala, and despite the fact both

Kenya and Uganda Governments policies advocate that long distance haulage should be by rail, it is interesting to note that most of the freight (exports and imports) is still carried by trucks. These trucks are mostly owned by private transporters in the respective countries who have jointly formed strong transport associations. The associations solicit Government contracts to transport goods within the countries as well as to the neighbouring countries.

3.3 Inland Waterways Transportation

As discussed earlier, historically, the inland waterways transport system in East Africa was an integral part of the Railways before the break up of the East African Community in 1977. Detailed discussion about the present inland waterways shipping on Lake Victoria is covered in the next chapter.

Lake Tanganyika (Fig.1) also has an active inland waterways transportation system. It is shared amongst Tanzania, Zambia, Zaire and Burundi. Each of these countries operates its own fleet on the Lake and for Tanzania, these services are provided by TRC marine services. The major ports on this Lake are Bujumbura (Burundi), Kigoma (Tanzania) and Kalemie (Zaire). Barges and tug boats are mostly used to connect Kigoma

and Bujumbura, Kalundu and Kalemie in Zaire, and occasionally, Mpulungu in Zambia. This transportation system, until recently, only served Burundi, Rwanda and Kivu Province of Zaire, besides the local traffic between the states bordering the Lake (15). The dislocation of traditional traffic patterns in the southern part of Africa however, resulted in a rather substantial increase of transit traffic from Zaire to Dar es Salaam via Kigoma. The annual cargo throughput of Kigoma is about 200,000 tonnes which represents 100% of its physical capacity.

Inland waterways transport also exists on Lake Kivu (shared by Rwanda and Zaire) and Lake Malawi also known as Nyasa (shared by Tanzania, Malawi and Mozambique). Fleets on Lake Malawi are mostly operated by TRC marine services and Malawi Railways Corporation.

CHAPTER IV

INLAND WATERWAYS SHIPPING ON LAKE VICTORIA

4.1 Topography of the Lake

Lake Victoria lies between the Eastern and Western Rift Vallies, 1,134 m above sea level and is the largest lake in Africa. It covers an area of 68,423 square kilometres and is second only to Lake Superior as the largest fresh water lake in the world (16). The northern part of the Lake is bounded by Uganda and on the east by Kenya. The whole of the southern shore is in Tanzania (see Fig.1).

This Lake is also situated on the equator and forms the chief reservoir of the river Nile which leaves the Lake at Jinja. The Kagera river, the largest and most important of the Lake affluents rises east of Lake Kivu and enters the west side of Lake Victoria just north of latitude 1° S. The only other river of note entering from the west is the Katonga, north of Kagera. On the southern shore, a number of short rivers drain into the Lake. The only outlet is the Nile.

The Lake Victoria region is one of the most densely populated in Africa; within 50 miles of its shores live several million people. Export cash crops, mainly coffee and cotton, grow around the shores of the Lake as illustrated in Fig.2. Fisheries are also important as one of its resources.

Inland water transport and communication on the Lake is provided by the marine services operated by the Railways Corporations of the three respective countries sharing the Lake.

4.2 Main Ports and their Facilities

The main ports on Lake Victoria (see Fig.6) which can be regarded as international due to the fact that they have facilities to serve the three countries are: Kisumu (Kenya); Mwanza, Musoma and Bukoba (Tanzania); Jinja and Port Bell (Uganda). These ports, which used to be operated by the defunct East African Railways Corporation, were designed as links between railroad and inland waterways in the three countries. Rail connections with the maritime ports of Dar es Salaam and Mombasa are provided through train ferry terminals at Kisumu, Mwanza, Jinja and Bukoba (Kemondo Bay) as illustrated in Figures 1 and 6.

Kisumu Port

This is the biggest of the Kenyan ports on the Lake and its facilities include:

(i) a rail-wagon ferry berth 18 m wide with a 28 m link span designed for vessels of the UMOJA class (see Fig.7),

(ii) a wharf of 333 m with cranes,

(iii) one cargo shed served on both sides by rail,

(iv) a railway yard to serve the wharf,

(v) a drydock with a capacity to take vessels up to 1,600 GRT, and

(vi) repair dockyard supporting the drydock.

Mwanza Port

This is the main port on the Tanzanian side on the south of the Lake (Fig.6) and is the link to Jinja on the Central Corridor. Mwanza has the following facilities:

(i) a rail-wagon ferry terminal similar to the one at Kisumu,

(ii) a wharf of 280 m long served with four cranes,

(iii) two transit sheds for break bulk cargoes and handling equipment, and

(iv) two railway yards to serve the wharf and the wagon ferry terminal.

Jinja Port

Jinja is the main Ugandan port (also second largest city) and is the north most on Lake Victoria with the following facilities:

(i) a rail-wagon ferry terminal similar to the Kisumu and Mwanza ones,

(ii) a railway yard capable of accommodating a ferry load of wagon, and

(iii) a station with capacity for 210 wagons.

Bukoba port

Located on the western part of the Lake within the Tanzanian waters, Bukoba port facilities include a ferry-wagon terminal at Kemondo Bay capable of taking the UMOJA class rail-wagon ferry. Road connections to Rwanda and Burundi do exist.

4.3 Kenya Railways Marine Services

Kenya Railways Marine Services on the Lake became operational in 1978 after the break up of the East African Railways Corporation. Prior to that, all the marine

services within the three partner states of EARC were operated under one Inland Waterways Act. After the break up, each country established its own Railways Corporation Act with "special provisions relating to Inland Waterways". The general format of each country's or Corporation's Act did not differ much from the one of the defunct EARC except for the ports and scope of service provision since each country was now limited to its territorial waters. For the case of Kenya, the territorial ports are defined in the third schedule of the Act (17). These ports include Kisumu, Kendu Bay, Homa Bay, Asembo Bay, Mbita and Karundu. The composition and type of vessels that serve these ports are described below.

Kenya Railways Fleet on Lake Victoria

In comparison to Tanzania and Uganda, Kenya's territorial waters on the Lake is the least in area. Table 3 shows the particulars and composition of the vessels operated by KR. The three passenger vessels namely KAMONGO, RELI and ALESTES are used for passenger movement within the Kenyan territorial waters in the Winam Gulf connecting Kisumu to other smaller ports.

Cargo movement within the territorial ports is mostly agricultural produce like maize, beans and cotton; and

manufactured products such as cement and galvanised iron sheets. The system of cargo transportation is by either of the two tugs KAVIRONDO and HOMA (table 3) which are used for towing lighters. Figures from KR Kisumu District Annual Report show that the total annual cargo movement by the Lake transport in 1977 was 44,305 tonnes and by 1981 it had dropped to 12,677 tonnes (18). The main reasons for this, inter alia, are:

(i) the lighters and the tug HOMA are too old (49 years),

(ii) lack of loading and unloading facilities at most of the smaller ports used by the lighters, thus resulting to poor turn round time (for example lighters have been known to stay at Kisumu for more than ten days waiting for discharge), and

(iii) the tug KAVIRONDO is more than 70 years old, steam propelled, low speed and heavy maintenance and fuel consumption costs.

With improvement in the vessels, the levels of annual cargo volumes transported in the mid 1970's could still be achieved since most of the commodities transported by lake are low value goods which are very suitable for lighters. Fig.2 also shows that most of the cash

crops grow around the Lake shores and therefore the demand for transport will always be there.

The only vessels in the Kenyan fleet which can be used for international transportation are the rail-wagon ferry UHURU (same as UMOJA class, see Fig.7) and the steam ship NYANZA. Since the break up of EARC in 1977, these two vessels were laid up at Kisumu as they were too big to operate in other Kenya's territorial ports which have only limited facilities. International Lake services between Kenya and Tanzania however resumed in 1985 after eight years of border closure. These services were mostly for passengers and petroleum oil products between Kisumu and Mwanza and were transported by Tanzanian vessels.

The rail-wagon ferry UHURU was rehabilitated and started services again in February 1986 (see Appendix IV) after being laid up for nine years. Her maiden voyage was from Kisumu to Bukoba in Tanzania and her cargo was 15 trucks and trailers loaded with goods destined for Rwanda, Burundi, Zaire and Tanzania. This route was opened to link five countries and also to cut down on the road distance that the trucks have to travel from Kigali, Bujumbura and Zaire via Kampala on the Northern Corridor (see tables 13 and 14).

An observation of Table 3 reveals that the average age of the Kenya Railways fleet on the Lake is over 40 years old. This calls for further improvements to bring the fleet in line with modern developments in the international maritime sectors. Improvement is essential due to the following factors:

(i) development of modern diesel engine technology has led to high propulsive efficiencies and lower fuel consumption and maintenance costs,

(ii) application of modern techniques in the field of navigation, engine room automation and cargo handling gear result in higher productivity and optimum vessel utilization,

(iii) new international conventions/standards have been developed as regarding safety of ships, cargo and personnel in the waters such as: SOLAS 1974, and COLREG 1972,

(iv) international requirements regarding standards of training, certification and watch keeping for seafarers have changed with the coming into force of the 1978 STCW, and

(v) the old system of a tug towing lighters has been abandoned completely and has

been replaced by the more efficient units consisting of a push boat and 4 barges or by modern self propelled vessels.

The features and characteristics of Lake Victoria are almost similar to what could be referred to as "near-coastal voyages". To be able to meet the improvements suggested above, it will be very necessary to update the Inland Waterways Act and harmonise it with the Kenya Merchant Shipping Act of 1967. This system is adopted in countries like Norway, Finland which has a lot of inland lakes, and also in Sweden. Tanzania has in fact harmonised its inland waterways act with that of the merchant shipping.

4.4 Tanzania Railways Marine Services

Tanzania Railways Corporation has a well developed and established marine department which operates all the inland waterways transport not only on Lake Victoria but also on Lakes Tanganyika and Malawi. It operates a total of 17 vessels including passenger ships, railway ferries, cargo ships, tankers, tugs and barges (19). Fifteen of these vessels have a gross register tonnage of more than 50. For the purpose of this study, only the marine services on Lake Victoria will be discussed.

Since Tanzania has the biggest portion of Lake Victoria, it was natural that she had to retain most of the vessels formerly owned by EARC after it broke up in 1977. Also compared to Kenya and Uganda which have only one major port each with good facilities (Kisumu and Jinja respectively), Tanzania has three major ports. Inland waterways transport on this Lake is an essential service in Tanzania for both freight and passenger movement as most of the roads are impassable during the rainy seasons. The Tanzanian Inland Waterways Act has been incorporated with the Merchant shipping Act of 1967 and amended in 1981 to bring it in line with the present requirements of 1978 STCW. This is a step forward that the Government has already taken though it has only adopted the requirements of the 1978 STCW Convention but not yet ratified it.

Tanzania Railways Fleet on Lake Victoria

Table 4 shows the composition of Tanzania Railways fleet on Lake Victoria which are above 50 GRT. Apart from the vessels shown in this table, TRC also has other crafts for freight only including lighters, barges, self-propelled barges and tugs. Prior to the resumption of marine services between Kenya and Tanzania in 1985, the four passenger vessels VICTORIA, BUKOBA, CLARIAS and BUTIAMA operated only between the Tanzanian

ports (see Fig.6) and occasionally called in Uganda.

After re-opening Kenya - Tanzania border, VICTORIA was deployed between Bukoba - Mwanza - Musoma and made a call once a week to Kisumu. The utilization proved to be poor especially between Kisumu and the Tanzanian ports. This resulted in VICTORIA being withdrawn and BUKOBA coming in as a replacement. As for cargo movement between Kisumu and the Tanzanian ports, the tanker NYANGUMI was deployed for transporting petroleum oil products from Kisumu.

The most significant international route operated by TRC Marine Service is that between Mwanza and Jinja on the Central Corridor for Uganda's external trade. The memorandum of understanding signed in June 1982 between TRC and URC constituted a working agreement between the two corporations on provision of services on this route (20). The main features, inter alia, of this memorandum are:

(i) Agreement on the frequency of wagon ferry service between Jinja (URC) and Mwanza (TRC) ports. TRC to provide through train services between Dar es Salaam and Mwanza.

(ii) Agreement on working procedures including places of interchange, (Jinja when TRC's

ferry is operated, Mwanza with URC's ferry).

(iii) Agreement on accident/casualty investigation procedures and repairs of rolling stock.

(iv) Agreement on tariff with revenue being apportioned (rated) by distance, according to the territorial jurisdiction of the two states, i.e. up to the middle of the Lake irrespective of wagon ferry ownership.

Under the above agreements, the TRC wagon ferry UMOJA (Fig.7) was to call at Jinja three times a week or other mutually agreed frequency to transport Uganda's external trade. Accurate statistics of actual cargo lifted by UMOJA is not available but it is known that the movement was mostly one way coffee exports from Uganda. It should however be noted that this route was decided by Uganda as an alternative route purely for strategic reasons, in order to reduce its dependency on the traditional Northern Corridor route through Kenya. One of the major constraints on this Central Corridor route was due to poor locomotive and wagon availability of TRC as discussed in section 3.1.4. The frequency of the UMOJA calling at Jinja was reduced if not withdrawn in October 1983 when M.V. KAAWA (same as

UMOJA class, see table 5), the first of the three rail-wagon ferries ordered by Uganda Government, was commissioned and put on the Jinja - Mwanza route.

Analysis of data in table 4 reveals that the average age of the Tanzanian fleet on the Lake is approximately 20 years. This is about half of the average age for the Kenyan fleet. TRC has also ordered two new additional passenger vessels and are expected by end of 1986. One of these vessels is to carry 500 passengers, the second 500 tons of cargo and 50 passengers.

4.5 Uganda Railways Marine Services

Until 1983, when the first of the three rail-wagon ferries ordered by Uganda Government was commissioned (table 5), the marine services of Uganda Railways was very little. The main ports in the Ugandan territorial waters are Jinja, Entebbe and Port Bell (Fig.6). Entebbe also serves as the main international airport of Uganda while Port Bell is only 10 km away from the capital city of Kampala. Plans are under consideration to build a second train wagon ferry terminal at Port Bell and the Kagera Basin Organisation Authority has already completed feasibility studies to that effect (12).

Uganda Railways Fleet on Lake Victoria

In a move to find an alternative outlet to the sea, the Government of Uganda decided in 1982 to try and route some of its external trade through the Central Corridor. This led to the signing of the memorandum of understanding between URC and TRC. At the same time, Uganda ordered three new rail-wagon ferries to be built to supplement TRC's wagon ferry UMOJA. A drydock was constructed at Port Bell in which the three wagon ferries were assembled and one service launch. Prefabricated sections of the wagon ferries were shipped from Belgium to Mombasa port, from where they were transported by road to Port Bell and assembled in the drydock by Belgian Shipbuilders Corporation. The estimated price of each assembled ferry was approximately US$ 4.5 m as at 1985.

The first ferry KAAWA was commissioned in October 1983, second and third in 1985 (see table 5). In the first six months of 1984, KAAWA is reported to have made 32 sailings between Jinja and Mwanza while TRC's UMOJA made 14 sailings. A look at table 10 shows that before 1983, there was no Uganda transit cargo through the port of Dar es Salaam. In 1984, Uganda's transit cargo was highest at 31,830 tonnes having increased from the 1983 figure by 11,130 tonnes. The figure for 1985 of

24,900 tonnes reflects a drop by 6,930 tonnes from 1984. This indicates unutilized ferry services since all the three ferries had already been commissioned.

Talks were held between KR and URC in 1985 on possibility of starting a rail-wagon ferry service between Jinja and Kisumu, but the outcome of these talks is yet to materialize. It can be seen from table 5 that the average age of these wagon ferries is less than two years, and, as deduced from the transit cargo through Dar es Salaam (table 10), there is already unutilized over capacity on the Central Corridor route. There is a need to look for other possible routes to utilize the three ferries such as the Northern Corridor route.

CHAPTER V

THE ROLE OF THE EAST AFRICAN SEAPORTS AND THEIR HINTERLAND RELATIONSHIPS

5.1 Introduction

The major East African seaports of Mombasa, Dar es Salaam and Tanga have grown a long way from the days when they used to handle dhows that were originally blown there by the monsoon trade winds from the Middle-East and India. These dhows then had months to off-load their cargoes of mostly spices and negotiate shipments of ivory and slaves before the wind changed direction to take them back (21). Inevitably, as the trading patterns changed over the years, the ports have also been forced to alter their structure and today, they have facilities to take most of the modern vessels engaged in world seaborne transportation.

A port is a node and a link between inland transport and water transport systems and many variables define it such as: hinterland characteristics, intermodal connections, port services, types of cargoes, and types of vessels using it. However, the primary elements that define a port's business remain its geographical loca-

tion, economy and foreign trade of the hinterland. The ports of Mombasa in Kenya, Dar es Salaam and Tanga in Tanzania serve a hinterland of not only their own countries but also neighbouring land-locked countries like Uganda, Rwanda, Burundi and Zambia; and also Eastern Zaire and Southern Sudan.

5.2 Mombasa Seaport

5.2.1 General Description

The port of Mombasa is Kenya's chief port, the Northern Corridor port and is strategically located in East Africa. Its importance as a gateway to East Africa is reflected by the handling of 72% of the region's annual international waterborne external trade (22). Connection between Mombasa and the hinterland by rail and road (Fig.1) has been discussed in chapters II and III.

Because each of the East African countries depends upon agriculture for subsistence and foreign exchange earnings, the business of the port of Mombasa reflects these regional economies as coffee, tea, cotton and other agricultural products represent primary exports (see Fig.2). Total trade volume therefore fluctuates in accordance with the ebbs and flows of regional

Governments and industries.

Mombasa port is managed and operated by the Kenya Ports Authority (KPA), a Government parastatal formed after the break up of the East African Community in 1977. Stevedoring until December 1985 used to be handled by Kenya Cargo Handling Services Company Limited which was a subsidiary company of KPA. This company has since been merged with KPA as from the beginning of 1986. The total traffic handled at the port averages about 6.83 million tonnes per annum, representing 1500 ship calls per year. Table 6 shows total annual cargo throughput at Mombasa port for the period 1979-85.

5.2.2 Port Facilities at Mombasa

Mombasa is a deep water natural harbour with the following facilities, inter alia, for accommodating ships of various sizes:

(i) Sixteen deep water berths on a linear quay face equipped with cranes of various lifting capacities, transit sheds and stacking ground for storage of yard cargo. A new container terminal having a quay length of 732 m and stacking area of 45 acres has been constructed with

capacity of 250,000 TEU per annum. Berth no.9 is an open berth equipped with two conveyors for handling bulk soda ash exports and a pipeline for molasses exports.

(ii) Two bulk oil jetties.

(iii) Two bulk cement berths with storage silos.

(iv) One cased oil jetty.

(v) Two lighterage wharves.

(vi) One explosives jetty.

(vii) Two dhow jetties

(viii) Cold storage facilities.

(ix) Specialised facilities for bulk liquids.

The port can accommodate vessels of up to 100,000 tonnes DWT with dimension restriction of up to 305 m length overall and 13.72 m draft. A tidal range of 3.96 m gives the port some flexibility when accommodating large vessels. Up to 24 vessels can be worked on at any one time.

Kenya Ports Authority also operates an Inland Container Depot (ICD) in Nairobi some 540 km from the port, which acts as an "inland port". The ICD occupies a total area of 41 hectares and the estimated (23) annual throughput by 1988 is 80,960 TEU. It is linked to the

port by rail (see section 3.1.2) and is equipped with two rail mounted gantry cranes, six rubber tyred gantry cranes, tractors and trailers and other ancillary supporting equipment.

5.2.3 Transit Cargo through Mombasa

Mombasa port is the sea outlet for land-locked Uganda, Rwanda and Burundi; Eastern and Southern Sudan. The transit traffic is therefore dependent on the economies of these countries and fluctuates yearly. The percentage of the transit traffic to the total traffic through the port is about 7%. For the purpose of this study, only transit traffic for Uganda, Burundi and Rwanda is considered and is as shown in table 7 for the period 1979-85.

Though current estimates show that 85% of the total dry general cargo traffic handled at Mombasa port is actually containerised, only a small portion of this is transit cargo. This is because infrastructure and facilities in Uganda, Rwanda and Burundi is only very marginally capable of accepting containers. No suitable terminal handling facilities exist in these countries and both road and rail haulage operate under rather severe capacity constraint (24).

5.2.4 Inland Transport to the Hinterland

Inland connection from Mombasa to the hinterland is shown in Fig.1 and transport communication links have been discussed in chapters II and III. Appendix I (2) defines the transit routes for road and rail traffic to and from the hinterland. An inter-rail operational arrangement does exist between Kenya Railways and Uganda Railways Corporations for movement of goods to and from the port.

Road hauling operations are carried out by both private and parastatal organisations in the region and there is very keen competition between rail and road services in those routes where the two modes offer the user alternatives. As has been mentioned earlier, Kenyan hinterland has a slightly better capacity to absorb containerisation than the other land-locked countries in the region using Mombasa port. Movement of containers within Kenya has so far been predominantly by road, partly because the railway system does not have adequate capacity, and partly because road hauliers have been far more aggressive and they offer greater flexibility. This has remained so despite the Kenya Government's policy of long distance modal shift from road to rail.

In February 1985, the Governments of Kenya, Uganda, Rwanda and Burundi became contracting parties to the Northern Corridor Transit Agreement and are now referred to as Northern Corridor States. Article 2 of this agreement (Appendix I) defines "Northern Corridor" as the transport infrastructure and facilities in East Africa served by the port of Mombasa. Tables 13 and 14 show different routes and transport modes serving Uganda, Rwanda and Burundi and their distances.

5.3 Dar es Salaam Seaport

5.3.1 General Description

Dar es Salaam is the second largest port in East Africa after Mombasa and is also Tanzania's capital city. It serves the Central Corridor hinterland countries of Burundi; the area of Eastern Zaire bordering the western shores of Lake Tanganyika; Rwanda to a lesser extent; and Zambia, as a result, mainly of the construction of TAZARA. Uganda also started using Dar es Salaam port as an alternative to Mombasa from 1983 (see section 4.5).

Like Mombasa, the major export commodities handled at the port of Dar es Salaam are agricultural (Fig.2), mainly cotton, coffee and sisal. The management and

operation of the port is carried out by Tanzania Harbours Authority (THA), a Government parastatal formed in 1977 after the break up of East African Community and split of East African Harbours Corporation.

The total traffic handled at the port of Dar es Salaam averages about 2.4 million tonnes (25% of Northern and Central Corridor traffic) per annum representing around 820 ship calls. The main difference in the levels of the total cargo throughput handled by Mombasa and Dar es Salaam may be attributed to the large and diversified hinterland served by the port of Mombasa which generate larger volume of transit cargo (25). Table 8 shows total annual cargo throughput at the port of Dar es Salaam for the period 1979-85.

5.3.2 Port Facilities at Dar es Salaam

Dar es Salaam is a limited deep water port with the following main facilities:

(i) Eleven deep water berths with total quays length of 2,016 m. These berths have between them 44 portal cranes of 7 tons capacity each.
In addition to the berths, there are two coaster anchorages.

(ii) Bulk oil jetty at which tankers of up to

20,000 tonnes DWT can discharge.

(iii) Mobile cranes of various sizes.

(iv) Container terminal with quay length of 549 m, stacking area 5.2 hectares and annual throughput 30,000 TEU.

The port can accommodate vessels of up to maximum length overall 183 m and draft 10 m. Future development plans include conversion of berths nos. 9-11 into full container terminal (21). Each berth will be 183 m long with a back up area of 5.2 hectares capable of handling 100,000 TEU per annum by 1992 but ultimately having a maximum throughput of 150,000 TEU. A rail terminal will also be built at the rear of the terminal to serve TRC and TAZARA. The plans also suggest that an Inland Container Depot (ICD) should be built at Ubongo, some 10 kilometres from Dar es Salaam. Two additional deep water berths Nos. 12 and 13 may also be constructed in the near future.

5.3.3 Transit Cargo through Dar es Salaam

Transit cargo through Dar es Salaam port is mainly destined for Zambia, Burundi, Rwanda, Zaire and Uganda as mentioned in section 5.3.1. Zambia's cargo (mostly copper) accounts for more than 75% of the transit cargo and about 45% of the total cargo throughput handled

at the port. Only transit cargo for Uganda, Rwanda and Burundi has been considered here and is as shown in table 10 for the period 1979-85..

5.3.4 Inland Transport to the Hinterland

The transport network system linking Dar es Salaam port and the hinterland is still poor - especially the road system. The only bitumised road (Fig.1) is the one running from the port to the south through Morogoro - Iringa - Mbeya, a distance of 893 km, and the one from the port to Arusha through Moshi, a distance of 632 km. All the other roads are either semi-bitumised or gravel and thus rendering some of them only passable during dry season.

The TRC and TAZARA rail lines are as shown in Figure 1 and described in section 2.4. Transit cargo to Burundi and Rwanda is carried by rail to Kigoma from where it is transported by inland waterways on Lake Tanganyika to Bujumbura. Uganda transit cargo is carried by rail to Mwanza then by inland waterways on Lake Victoria to Jinja (see chapter IV), using one or more rail-wagon ferries capable of carrying containers. There are proposals to provide some small container berths and stacking space on the shores of Lakes Victoria and Tanganyika to aid movement of containers from Burundi,

Rwanda and Uganda (26). This will be in line with the expansion of the container terminal at Dar es Salaam mentioned earlier.

The Zambian transit cargo is served by TAZARA railways which operates separately from TRC (see section 3.1.5). Two trains daily operate between Dar es Salaam and Kapiri Moshi, a distance of 1,857 km. Each train consists of 15 wagons capable of carrying 30 containers.

Tables 13 and 14 show different routes and transport modes linking Dar es Salaam port and the hinterlands of Uganda, Rwanda and Burundi.

5.4 Tanga Seaport

5.4.1 General Description

Tanga is the second largest port of Tanzania. It is a natural harbour with no deep water berths but only lighterage facilities for working ships at anchor in the stream. Tanga has also been classified as an outlet port for the Central Corridor States (Burundi, Kenya, Rwanda, Tanzania, Uganda and Zaire) stretching from Lake Victoria along road and rail routes. However, this will only be possible after the proposal to construct a new rail line (see Appendix III) linking Aru-

sha to Musoma has been implemented.

The total cargo handled at the port of Tanga averages about 278,000 tonnes (3% of Northern and Central Corridor traffic) per annum representing around 200 ship calls. The main exports are sisal, coffee, seed beans, fertiliser and cement whereas the main imports are raw materials for fertiliser plant and general cargo. Some container vessels that used to unload at Dar es Salaam port now call at Tanga direct though they have to use their own gear/crane for loading and discharging.

Table 9 shows total annual cargo throughput at Tanga port for the period 1979-85.

5.4.2 Port Facilities at Tanga

All berthing at Tanga, except bulk cargo, is carried out at anchor and the facilities available include:

(i) Eleven safe anchorages marked by means of beacons,

(ii) fertiliser jetty with a single berth of 16 m maximum draft,

(iii) lighter wharf of length 240 m and depth of 2.44 m,

(iv) eight sheds for reception and stacking of cargo served by both rail and road,

(v) lighterage quay where Ro/Ro vessels with maximum draft of up to 4 m may berth, and

(vi) pontoons for handling containers after they have been unloaded using ship's gear.

The inner harbour has seven anchorages where deep sea vessels with maximum length of 213 m and draft of 9.5 m are handled at the outer harbour which has 3 anchorages.

5.4.3 Transit Cargo through Tanga

There is no transit cargo traffic using the port of Tanga at present until the proposals for using it as a Central Corridor port, referred to in section 5.4.1, are implemented. This will shorten the distances for Uganda and Rwanda traffic to the seaports as seen in tables 13 and 14.

5.4.4 Inland Transport to the Hinterland

Road network in Tanzania is so atrocious that it makes it impossible to move shipments of coffee from the growing area around Moshi to Dar es Salaam. It is because of this that these exports are now routed to

Tanga. There is a railway line (Fig.1) between Tanga and Arusha through Moshi. This line is also linked with Kenyan railways section from Moshi to Voi. Inland transportation from Tanga will be improved when the proposed plans to join or extend the railway line to Musoma port on Lake Victoria will be implemented.

CHAPTER VI

OVERVIEW ON ECONOMIC ASPECTS OF INLAND TRANSPORTATION SYSTEMS

6.1 Introduction to Modal Choice and Transport Costs

Modal choice can be defined as a process by which organizations or users choose between one or more of three major modes of inland commercial freight transportation in order to fulfill their physical districution needs. The demand for transport services is determined by the geographical differences, or between the points of production and the points where commodities will be eventually consumed. Costs to transport users are determined by the prices the producers charge for their transport services. Transportation costs are therefore sensitive as a proportion of the total price that the consumer has to pay for the goods.

Whenever there are different modes or alternatives such as rail, road and inland waterways, the user will always be interested in the least cost as well as most efficient. In the case of East African external trade where three seaports serve the hinterland countries

the user will also be interested in the port efficiency. Public subsidies to scheduled services such as railways contribute to less competitiveness and therefore destroy connection between real costs and prices of transportation.

When choosing a preferred inland transport mode to or from a seaport, the user must not only look on the freight tariff but on all elements that will contribute to his total transport bill. All these elements, inter alia, constitute the quality of service and may be regarded as:

- freight charges,
- pick up and delivery times,
- loading/unloading facilities and charges at both ends,
- transit density and time,
- security of cargo in transit,
- clearing and forwarding charges,
- value of consignment,
- size and weight of consignment,
- port dues,
- port efficiency,
- flexibility of service,
- length of haul,
- tolls,
- insurance,

- transhipment charges,
- speed and efficiency of customs documentation and procedure,
- port facilities, and
- availability of rolling stock.

The greater or lesser efficiency of one mode of transport, which affects transport costs, influences choice of the other mode of transport. Where all three modes of transport i.e. rail, road and inland waterways are equally available, a greater consideration may be given to the energy consumption efficiency. The American Water Operators (AWO), proved that the efficiency of the inland waterways transport industry was the most telling weapon in the struggle against the rather powerful voices of road transport and railroad interests (27). The AWO compared the fuel efficiency of truck, railroad and inland waterways barge, and showed that:

- a large diesel truck can move one tonne 59 miles on one gallon of fuel,
- the railroad is able to shift same weight 202 miles on same quantity of fuel,
- while the inland waterways barge is capable of hauling the cargo no less than 514 miles.

A recent economic profile on the U.S. inland waterways

(28) industry also gave the following comparison data on cargo carrying capacity:

- one hopper barge is equivalent to fifteen 100-ton rail cars, or 60 trucks with capacity of 25 tons each,
- one barges carries up to five times its weight in freight.

From the above two comparisons, it can be observed that from the energy point of view, the inland waterways gives the lowest transportation cost per tonne of cargo carried. If the real costs of transport service are minimised, then the transport service providers can be able to charge competitive tariffs to users and hence influence modal choice. The savings in road fuel consumption in monetary terms, achieved by choosing lower energy consumption transport modes, will be a significant savings to developing countries like the East African ones - whose annual importation bill for petroleum products takes a significant share of total export earnings.

6.2 Railroad Transport

The railroad system consists of roadbed and rails, rolling stock, terminals, locomotives, wagons of various kinds for hauling the wide variety of freight presented for shipment as well as buildings and other

facilities for serving and operating trains (29). All the above require a huge investment which is fixed and specialised capital. The railroads are therefore financed by public investment and operate as public carriers or statutory corporations. Rail transport, in order to be efficient should be able to realize economies of large-scale production by providing a means of cheap transport for particularly low value goods on a long distance.

In the developed nations, railraods reached their heyday in the years prior to World War I, when they were the only means of transportation available. However, during the last three decades, the length of the rail networks has steadily declined, except in heavily industrial zones (30). This decline has been of the order of 30% in the United States, in France and in Britain, and even reached levels of 50% in Germany. While total track length has decreased, freight traffic has been growing over the past 15 years: rising by 50% in France, Germany and Japan; doubling in Canada; tripling in India; and increasing by three and one half times in the USSR.

Railroads have several important limitations as transport systems. Within the last few decades, rail has given way to road transport for long distance inter-

action and export routes in many countries. The railways that were built remain important, but major highways have in most cases been constructed parallel to them. Unlike railways, highways provide fast inter-regional links that are well suited to the movement of major products, but have little direct local economic impact.

In East Africa, it was shown (section 3.1.1) that railways were built inland from the seaports to areas of export crop production, illustrated in Fig.2, from 1883. These railways played a predominance role in the economic and social development of the region until the early nineteen seventies when they started losing freight to the roads that had then been constructed parallel to them (see Fig.1). But in Tanzania, TAZARA railway (section 3.1.5), moves more than 20% of the world's copper production from Zambia and Zaire to the Indian Ocean seaport of Dar es Salaam.

Cost-Structure of Rail Transport

Comparison of cost-structure between rail and road transport reveals that distance is of considerable influence. Due to high fixed cost element in rail transport, a certain length of haul is required in order to make it a viable alternative mode. The relationship

between length of haul and competitiveness of rail and road has been illustrated by McKenna (31), and the author's analysis given in Fig.9 for containerised coffee movement in East Africa confirms this. Short hauls by rail would be more expensive than by road, where costs vary more proportionately with transport distance. For longer distances and for bulk consignments or low value goods, rail remains a cheaper and more suitable alternative mode than road transport.

There are two main reasons why railways have been losing their share of percentage of inland transport freight movement to roads: inherent inflexibility compared to roads, and deterioration of quality of service rendered. The first reason needs no elaboration and is a fact in all nations. The second case is observed in many developing countries like East Africa, the reason being, inter alia, short comings in maintenance programmes for rolling stock and permanent way, poor wagon availability and turn round times, and obsolescence equipment.

The introduction of containerization and multimodal transport concept has helped railways to eliminate or at least reduce the inherent inflexibility of the system (32). This concept has given rise to modal split and led to introduction of the unit trains (such as

"RAILTAINER" operated by Kenya Railways between Mombasa and Nairobi discussed in section 3.1.2) that offer terminal to terminal services. This type of service relieves the railways of costly and time-consuming shunting and marshalling operations. The final distribution of containers is then left to road operators who are able to offer door-to-door service. The main advantages of this unit trains system are given as:

- the railways are relieved of distribution services,
- the rolling stock is no longer bound at consignor's or consignee's premises, which results in an improved turn round of rolling stock,
- the organization of rolling stock employment is simplified, and
- infrastructural requirements are reduced to trunk-line requirements.

It should be noted however, that unit train concept, does require a minimum number of containers to be moved otherwise trains will be poorly utilized or minimum frequency of departures will not be maintained, thus involving costly delays in the transport chain. The minimum net tonnage of freight per year required to run a daily service of 20 two-axle wagons of 40 TEU capacity will range approximately 100,000 tonnes for

each direction (32). With containerization increasing even in East Africa (for example 85% of general cargo handled at the port of Mombasa is containerized) and from the economic point of view, users of long distance freight by land would switch to railroads if the quality of service could be assured.

6.3 Road Transport

Road transport is different from rail in many different aspects as highlighted in section 6.2, and consists basically of roads and the vehicles that use them. The major difference with rail is flexibility of operation due to independent movement of vehicles, different kinds and capacity of vehicles, and individual control. Road transport is characterized as financed principally by public investment in roads and public and private investment in vehicles. The nature of road transport provides flexible transport services mainly in the form of small business enterprises with ability for door-to-door delivery of consignments. It is most suitable alternative mode for short distances, but quantitatively, road transport constitute the most important single means of local transport today.

Roads are most suitable for small consignments of high value goods over short distances or medium distances.

However, as was discussed above, roads have also offered competition to railways even over long distance haulage on highways in many different parts of the world including East Africa.

Trans-national Highways

The most recent innovation in surface transport is the specialization of roads in the developed countries with ever expanding suburban zones. A World Monitoring System (30) under the auspices of the International Road Federation was created in Geneva for roads open to trucks weighing 30 metric tons. The most successful of these routes is the Pan-American Highway, which runs from Alaska to Chile through 16 countries. Each country crossed contributes to financing on a pro rata basis calculated by the total freeway length across its territory. Thus, for example, Mexico is responsible for 10,218 km, Brazil for 6,178 km and Nicaragua only 376 km.

Several such projects are under construction in Africa and Asia. The most advanced of these is the Trans-Saharan Road, which reaches up to Tamanrasset, while extending to the West Coast of Africa (Lagos) to the Indian Ocean through Uganda and Kenya, with a long North-South complement in the Trans-East African Highway be-

tween Cairo and Johannesburg.

The large-scale highway transport envisaged by the IRF is destined to play a complementary role to the railroads, which, in every part of the world, including Europe, are being overtaken by competition from trucks. In some countries where freight was being delivered to poorly equipped ports, from where it was relayed by inadequate railroads, trucking has displaced both railroads and in some cases coastal shipping.

Cost-Structure of Road Transport

Road costs are composed of fixed and variable costs. Between 90 and 100 per cent of operating expenses are directly proportional to output. Fixed costs can be regarded as:

(i) Interest on capital for vehicle,

(ii) Depreciation,

(iii) Insurance,

(iv) Driver's wage,

(v) Vehicle licence and other taxation, and

(vi) Overheads.

Variable costs by definition is zero when no output is being produced, but it changes with quantity of production or traffic density. Variable costs include:

(a) Fuel and lubricants,

(b) Tyres,

(c) Repairs, spares and maintenance, and

(d) Road/bridge tolls.

Because variable costs vary proportionally with distance, over a long length of haul, road transport becomes very expensive compared to rail as is illustrated in Fig.9. The road carrier, like the rail, also has a problem of back-haul and therefore the tariff charged for consignment transport must include back-haul or in case of containers, the cost of returning the empty container.

Besides the cost of actual freight movement of the truck operator, there are other indirect costs borne by public finance such as maintenance and upkeep of roads. This indirect costs prompt Governments like Kenya and Uganda to adopt policies of shifting long distance haulage from road to rail as was discussed in chapter III. Some countries like Kenya have introduced tolls on the roads in order to share upkeep and maintenance costs with the transport operators/road users. In addition to road transport costs mentioned above, Virag in ref. (29) lists the following as principal elements to be considered in movement of goods by road:

- loading of consignment;
- transport to line haul terminal;
- transfer to platforms for weighing, sorting

by destinations, weight billing and loading on the line haul vehicles;

- assembly of line haul vehicles;
- detachment of prime mover at terminal;
- transfer to platform for sorting by address of destination and loading local vehicles;
- transport to consignee premises; and
- unloading at consignee premises.

All above elements form total infrastructure to be considered in final modal choice especially on the impact of containerization. It was mentioned in section 5.2.3 that, because land-locked countries of East Africa lack terminal facilities to handle containers, only a small percentage of their transit cargo is containerised and that road haulage is done under severe constraints. Such constraints result in increased costs to users. But where suitable terminal facilities exist, road transport offers door-to-door services taking care of the other elements automatically, whilst in rail transport, they could be additional cost.

6.4 Inland Waterways Transport

Inland water transport may be referred to as transport on canals, navigable rivers or lakes. It is one of the world's oldest modes of transport that has played a significant role in economic and industrial develop-

ment of many centres around the world. Medieval Europe constructed (33) many canals in the 17th and 18th century connecting existing rivers such as the Rhine, Rhône, Danube and Seine that moved 85% of freight. This development enabled external trade over a longer distance and gave rise to trade centres that have turned into great cities where all kinds of economic activity is concentrated (34).

In North America, the Erie Canal, 580 km long on Lake Erie was completed in 1825. This enabled raw produce to flow to New York, with manufactured goods making the return journey westward, giving New York predominance over other Atlantic seaports (35). Other canals were subsequently built in North America and Canada to link all the five Great Lakes together, thus triggering explosive economic and industrial growth. The St. Lawrence Canal was opened in 1959 to link the Great Lakes to the Atlantic Ocean. This Canal, and the five Great Lakes it connects with the sea, also acts as the border between Canada and North America. This is the world's richest region served by the world's most efficient transportation system, extending from the Atlantic Ocean 2,400 miles into the heart of the Continent (36).

Water transportation in the U.S. moves almost 12% of

the U.S. freight tonnage, yet it accounts for less than 3% of the total freight bill - a truly cost efficient mode by any standard. 95% of the population in the U.S. lives in the states served by inland waterways network. Therefore the quality of life in all parts of the U.S. is affected, directly or indirectly by inland water transport.

As far as lake transportation is concerned, as opposed to river navigation, most of the vessels used are not very different from modern sea going vessels, except that inland waterways vessels generally have shallower drafts. The most efficient type of inland vessel is the barge or push boat system that was first introduced in America. This replaced the old system of a tug towing a number of manned lighters. In 1970, a standard push barge of the so called EUROPA II type with dimensions length x breadth x draft = 76.5 x 11.4 x 4.0 metres and cargo capacity 2,750 tonnes was introduced on the European inland waterways. This system is normally composed of a push tug pushing 4 barges. On the other extreme end, it is not uncommon in North American inland waterways to find a 10,500 horse power towboat pushing a fleet of 56 or more barges of 1,500 tonnes each as is illustrated in Figure 8. In East African inland waterways most of the vessels used, such as train ferries, passenger and cargo ships, are very

similar to the sea going fleet. The only exception is that the old system of tug pulling lighters is still used.

Cost-Structure of Barge-Transport

The efficiency of a barge in comparison to a road truck and rail transport was proved by the American water operators as discussed in section 6.1. In Europe, it has also been proved that the use of barges is the only real possibility for transportation on inland waters, of low value commodities, such as coal, ores, raw minerals, grain etc.

For example, a self-propelled modern motor-vessel with a loading capacity of 2,000 tonnes is able to carry 200,000 tonnes raw material per annum from Rotterdam to the Ruhr-area. A modern push-unit consisting of a 4,500 horse power push boat and 4 barges with a combined loading of 11,000 tonnes is able to carry 1,600,000 tonnes of bulk from Rotterdam to that same Ruhr-area per year (34). This reflects high productivity of the push-boat system that has been brought about by application of modern techniques in navigation, engine room automation, crew reduction and stevedoring facilities.

The transport sector in general uses 20% of total primary energy consumption and of this only 3% is by inland waterway transport. As mentioned above, inland water transport is in a relative and absolute sense the transport mode with the least energy consumption.

The "lowest total cost" criterion is important in evaluation of alternative modes of transport (see section 6.1). For inland waterways, total costs consist of two principal elements:

(1) cost of port facilities and vessel service cost (waiting time and service time of vessel in port), and

(2) ship's or vessel's fixed and voyage costs.

Fixed costs for ship are normally higher than rail fixed cost as can be seen in Fig.9 for URC rail-wagon ferry (dotted line). But as the distance of haul increases, transportation cost (variable cost) per tonne of cargo becomes much less than either rail or road. For a given volume of cargo and vessel capacity, optimization of port and vessel cost can be performed to predict how the components which determine port and ship costs are interrelated. The following break down identifies these components:

1. Port - 1.1 Capital cost

. land based facilities and terminals

- . berths
- . marine works . access channel
  - . fairways
  - . manoeuvring area
  - . breakwaters

1.2 Operational Cost
- . fuel
- . power consumption
- . labour cost

1.3 Maintenance Cost
- . depreciation
- . dredging

1.4 Vessel Service Cost
- . pilotage
- . tugs
- . stevedoring
- . down time

1.5 Waiting Cost
- . port closure
- . inadequate berth capacity
- . port inefficiency

2. Ship - 2.1 Fixed Cost
- . crew expenses
- . maintenance
- . insurance
- . overheads

. capital charges
  - . loan repayment
  - . depreciation
  - . loan interests
  - . taxation
  - . rate of return

2.2 Voyage Cost

- . fuel
- . stores and provisions
- . cargo handling
- . port dues
- . canal dues
- . repair costs and surveys.

The best vessel is the one that gives the lowest transportation cost per tonne - km with maximum cargo carrying capacity per annum and optimum number of days spent in port. Fig.10 shows graphs of transportation cost per tonne - km against cargo carried per annum for one of Uganda Railways rail-wagon ferries under different scenarios for port days (turn round times).

CHAPTER VII

INLAND TRANSPORT USER COSTS FOR THE EAST AFRICAN EXTERNAL TRADE

7.1 User Cost Comparison of Rival Transport Modes

It has been shown in the preceding chapters that East African external trade uses two corridors namely: Northern Corridor, with the port of Mombasa as the outlet and Central Corridor, with the ports of Dar es Salaam and Tanga as the outlets. Depending on the origin and final destination of the consignment (exports and imports), both corridors have a combination of one, two or three of road, rail and inland waterways as alternative modes of transport (Fig.1). These corridors serve not only the coastal countries of Kenya and Tanzania but also the land-locked Uganda, Rwanda and Burundi. For the purpose of this comparison of user inland transportation costs, only the three land-locked countries' external trade has been considered since they continue to pay high transportation charges. The general characteristics and economics of road, rail and inland waterways were discussed in chapter VI, and so in this chapter attempts have been made to apply these theories to calculate actual user costs on the Northern

and Central Corridors.

Statistics show that in 1960, road transport carried 20% and rail 80% of Mombasa port's total traffic. By 1975, the modal split was 60% by road and 40% by rail. Even at present it has been shown that a high proportion of transit cargo for Rwanda, Burundi and Uganda are moved to and from Mombasa by road contrary to the Government's policy of shifting it to rail. This policy was prompted due to high maintenance costs to the roads because of damage caused by heavy trucks. After observing that a 70-tonnes truck caused damage estimated at US$ 98,750 between Mombasa and Malaba on the Kenya - Uganda border, near Tororo Fig.1, (934 km - Northern Corridor) on one trip, and it cost the Government between US$ 218,750 and US$ 312,500 per kilometre in repairs, it was decided by the Government that the maximum allowed load on Kenyan roads would be 46 tonnes (37).

Economical analysis of the East African countries in chapter II established that the most important export commodity from the region is coffee, while for imports, machinery and transport equipment is second only to petroleum oil. Fig.9 shows a graph of inland transportation tariff in US$ per TEU of containerised coffee against length of haul for rival modes of transport in East Africa. These tariffs exclude port dues, bonds,

clearing and forwarding charges. A number of interesting features are derived from this Figure:

(1) Road (max.) line is based on the maximum tariff that has been set by the Governments of Burundi and Rwanda for transporting 2 m^3 of cargo or per tonne container load between Mombasa and Bujumbura or Kigali (i.e. US$ 206).

(2) Road (min.) line represents the minimum tariff that some road transporters charge. Competition between the truck hauliers would lie between the maximum and minimum tariffs depending on demand and supply conditions.

(3) Rails have a fixed cost element i.e.

TRC 142.67 US$ per TEU

KR 121.30 US$ per TEU

URC 104.00 US$ per TEU

independent of distance of haul.

(4) Variable costs of rail transport increase less than do those of road transport.

(5) For short hauls of TEU up to point E_1 (a distance of 230 km) on the graph, road is much cheaper than rail.

(6) At a distance of E_1 a break-even point is reached for all the three railways and the road. Beyond this point, rail transport

has a comparative advantage over road.

(7) The tariffs for lake (marine) services of both TRC and KR are same as for respective rail.

(8) Lake-URC (dotted line on the graph)-data in appendix V and also section 7.2.1 was used to estimate the transportation cost of one of URC rail-wagon ferry. This URC-Lake tariff has a fixed cost of US$ 192.48 per TEU due to high capital charges and annual running costs which are fixed regardless of capacity of cargo carried per annum. For short distances of haul up to 220 km, the URC-Lake tariff is more expensive than rail and road. Beyond 220 km, the cost of transportation by URC-Lake is cheaper than rail and road. If capital charges were ignored, then the lake transportation cost per TEU would even be much cheaper.

(9) Road marginal costs are much higher than those of the most expensive rail (URC), US$ 0.88 per TEU kilometre for road as compared with US$ 0.463 for URC rail.

(10) Given the nature of the graphs as illustrated in Fig.9, for distances increasingly in excess of 230 TEU kilometres,

rail's competitive advantage continuously increase, thus confirming economic aspects of rail discussed in chapter VI.

The above analysis show the rail's comparative advantage for long distance of haul in East Africa. Why then is more freight still moved by road? One can only attribute the reasons for this as due to other elements which contribute to total transportation bill and quality of service as was discussed in sections 6.1 and 6.3.

7.2 Comparison of Alternative Routes and User Costs

7.2.1 Methodology

In order to determine improvements and future development of inland transportation systems for East Africa's external trade on the two corridors, it is essential to compare the different routes and user costs both present and future, which can, or will be able to take Uganda, Rwanda and Burundi traffic.

Figure 1 shows the possible links from the land-locked countries to the seaports, Appendices I(1) and III define the routes and corridors whilst tables 13 and 14

compare alternative routes within the framework of the following criteria:

- length of route,
- mode of transport,
- number of transit countries to be crossed and corridor,
- export cargo (coffee),
- import cargo (motor vehicle spares),
- containerised or break-bulk, and
- average transportation cost/tonne in US$.

To be able to evaluate user costs given in tables 13 and 14, information and data given in the preceding chapters as well as in the appendices was used. However, general remarks on the approach used and assumptions made are as follows:

(1) Exports from hinterlands to the seaports

- Containerised coffee, 16.8 tonnes per TEU, 2 TEU consignment. Valued at US$ 2,800 per tonne.
- Bagged coffee, 40 tonnes consignment valued at US$ 2,800 per tonne.

(2) Imports from seaports to the hinterlands

- Containerised motor vehicle spares, 12 tonnes per TEU, 2 TEU consignment. Valued at US$ 2,650 per tonne.
- Break-bulk motor vehicle spares, 24 tonnes consignment. Valued at US$

2,650 per tonne.

(3) Port dues, clearing and forwarding charges and bond fees were estimated using published tariffs and are as tabulated in tables 11 and 12. Tanga port dues etc. same as Dar es Salaam.

(4) Inventory costs due to transit time were ignored.

(5) The marine services (lake) tariffs for Kenya Railways (KR) and Tanzania Railways (TRC), are same as respective rail tariffs in through booking carriage.

(6) Uganda Railways (lake) tariffs for railwagon ferry were estimated using data given in appendices II and V and Figure 10 (see also section 7.2.2).

(7) Currency exchange rates used:

1 US$ = 16.0 Kenya shillings.
= 19.3 Tanzania shillings.
= 420 Uganda shillings.

(8) Inland transportation cost per tonne estimate includes item no.3 above, all rail/lake/road costs, handling at terminals and transhipment points.

(9) Rail transport - The average cost of moving a tonne kilometre of freight was estimated for each of the three corpo-

rations as:

KR US$ 0.0256

TRC US$ 0.0161

URC US$ 0.0306

(10) Road transport - The average cost of moving a tonne kilometre of freight by road was estimated as (based on Rwanda & Burundi Governments set rates):

US$ 0.1046

The above comparisons, for each route were calculated and are as shown in tables 13 and 14. The deductions from these tables are discussed in the following sections for each country.

7.2.2 Uganda Traffic

For Uganda's transit export/import cargo, ignoring all other elements that influence final modal choice as given in section 6.1, tables 13 and 14 show that the most economical route is route no.2 (kampala - Mombasa by rail). However, if URC applied same tariff for lake as it does for rail then route no.3 (Kampala - Jinja - Kisumu - Mombasa) would be the most competitive. Analysis of economic performance of one URC rail-wagon ferry assuming optimal utilization also confirms this point.

Capacity and Costs of URC Rail-Wagon Ferry

Figure 10 shows graphs of transportation cost per tonne kilometre in US$ against cargo carried per annum for one of URC wagon ferries calculated using data and assumption given in Appendix V. The four curves representing different port days (port turn round time) and load factors follow a rather irregular pattern showing how the transportation cost per unit capacity is determined by various capacities of ferry utilization.

Regardless of port turn round time, the general tendency of the curves is that the transportation costs per tonne km fall with increasing annual cargo transportation capacity. This shows that we are in principle facing economies of scale. In practice, the following factors will also determine the amount of cargo per annum that the ferry can be able to carry:

(i) Port facilities place restriction upon port turn round time;

(ii) Factors limiting the size of consignment, frequency, availability of rail-wagons, either economically or technically influence load factors; and

(iii) Warehousing capacity both at shipper and receiver end, geographical pattern of production and consumption, natural cala-

mities all have profound effects on load factors.

The net result is that a wide variety of cargo consignments will come to the carrier demanding transport at different times.

Assuming a constant speed of 13 knots for one URC ferry between Jinja and Mwanza, with port turn round of half a day (12 hours), and either one way export cargo at 100% load factor with ballast return or cargo both ways at 50% load factor, it was calculated that:

- 195 round trips will be made per annum,
- the capacity of cargo carried per annum will be 85,800 tonnes represented by point X_1 on Fig.10, and
- the transportation cost per tonne kilometre will be US$ 0.066 represented by point Y on Fig.10 (inclusive of capital charges and all operating costs).

This value of US$ 0.066 per tonne km is high compared to that of URC rail which was given in section 7.2.1 as US$ 0.0306 per tonne km. However, the URC ferry transportation cost per tonne km would be lowered if more cargo was carried per annum or at the same cargo capacity of 85,800 more time was spent in port with increased load factors. The cost per tonne km would also be lowered if the capital charges were ignored or borne

by the Government instead of URC since the decision to build the ferries was for strategic rather than for economic reasons.

If and when the proposed project on route no.5 (kampala - Jinja - Musoma - Tanga) is implemented, it could out compete route no.3, depending of course on port dues and other charges at Tanga.

Present Routes for Uganda Traffic

The Uganda transit cargo through Mombasa and Dar es Salaam ports over the period 1979-85 is shown in tables 7 and 10 respectively. From table 7, it can be found that the average annual Uganda transit cargo through Mombasa is 236,182 tonnes compared to that through Dar es Salaam of 25,810 tonnes (1983-85) derived from table 10. This shows that despite the Government's decision to shift more cargo from the traditional Northern Corridor route to the Central Corridor (see section 4.5), 90% of total external trade cargo still use Northern Corridor while leaving 10% for the Central Corridor.

As was discussed in sections 2.3 and 3.2, most of Uganda's transit cargo on the Northern Corridor is by road. Coffee exports from Kampala is usually moved by a convoy consisting of 20 to 30 trucks twice a week

(21) using route no.1 in table 13. The entire journey by road takes four to five days compared with six days by rail. From table 13, it can be found that the saving in moving one tonne of containerised coffee from Kampala to Mombasa by rail instead of road is US$ 74.85. A saving for moving motor vehicle spares containerised over the same distance (table 14) by rail instead of road is US$ 104.79. The savings would even be more if a combination of rail and lake was used such as route no.3. The following deductions can also be shown:

(1) Figure 3 shows annual coffee exports from East Africa. The average annual Uganda coffee exports derived from this figure between 1979-82 is 138,000 tonnes. If all this coffee was moved to Mombasa by rail or rail/lake combination instead of road, the savings in transport cost alone would be approximately = 138,000 x 74.85
= 10.3 million US$/year.

(2) Table 2 shows the annual total value of exports and imports of all merchandise trade for the East African countries for the period 1973-82. From this table it can be derived that the average annual total import value for Uganda between 1979-82 is US$ 245 million. Of this value, machinery and transport equipment (motor vehicle

spares) accounts for 45% (see section 2.3). If all this machinery imports were moved by rail or rail/lake on routes nos.2 or 3 instead of road, the annual savings in transport costs would be:

$$= 245 \times \frac{104.79}{2650} \times \frac{45}{100} \text{ million US\$}$$

$$= 4.36 \text{ million US\$/year.}$$

The above savings justify the policies of both Kenya and Uganda Governments to shift long distance freight from road to rail. If URC charged the same tariff for lake as for rail, then route no.3 would be more economical and the transit cargo of 236,182 tonnes per annum through Mombasa is enough for one or two of the rail-wagon ferries on this route. It was mentioned in section 6.2 that the minimum freight per annum required to run a daily unit train concept of 40 TEU is around 100,000 tonnes in each direction. Building an inland container depot in Kisumu may be considered.

7.2.3 Rwanda Traffic

Tables 13 and 14 illustrate that there are seven possible routes for Rwanda's traffic to reach the seaports /route nos. 6 to 12). Routes no. 10 and 11 are proposed routes subject to construction of new rail

lines (see section 2.5 and Appendix III). An observation of tables 13 and 14 reveals that the most economical route for Rwanda traffic cargo is no.12 on the Central Corridor (Kigali - Bujumbura - Kigoma - Dar es Salaam). It was mentioned in section 2.5 that 85% of Rwanda's exports are taken to Mombasa by road using route no.6 and the remaining go through Dar es Salaam using route no.12. Tables 7 and 10 also reveal that 95.6% and 4.4% of total Rwanda external trade go through Mombasa and Dar es Salaam respectively.

A look at table 13 shows that the transportation cost per tonne of containerised coffee from Kigali to Mombasa on route no.6 is US$ 228.58, and on route no.12 from Kigali to Dar es Salaam is US$ 136.37 (reflecting a difference of US$ 92.21). A similar look at table 14 also reveals that the transportation cost per tonne of containerised motor vehicle spares on route nos.6 and 12 is US$ 333.98 and 193.30 (reflecting a difference of US$ 140.68) respectively. One would then be tempted to ask why Rwanda uses the most expensive Northern Corridor route for 95.6% of her external trade and the remaining 4.4% on the most economical route through Dar es Salaam. The answer to such a question may be found in section 6.1 where it was shown that when choosing preferred inland transport mode or route, users do not only look on freight tariff but on all

elements which contribute to the total transport bill as well as quality of service. The reasons why Rwanda uses route no.6 through Mombasa instead of route no.12 through Dar es Salaam are:

(i) Transit time is quicker through Northern Corridor,

(ii) Mombasa port is more efficient and less congested than Dar es Salaam, and

(iii) Transhipment port of Kigoma on Lake Tanganyika through which route no.12 passes is equally congested due to the fact that Kigoma port already handles some 200,000 tonnes of cargo per year, and operates at 100% of its physical capacity (section 3.3).

Present Routes for Rwanda Traffic

Apart from route no.6, Rwanda still has three other alternative routes on the Northern Corridor to Mombasa (routes nos.7, 8 and 9) as shown in tables 13 and 14. If the policies of Kenya and Uganda Governments of shifting long distance freight from road to rail were implemented, then routes nos.7 and 9 could be more competitive and economical for Rwanda since they involve road/lake/rail combinations. At present however, the only option left for Rwanda is routes nos.6 and 8.

The former has always been Rwanda's traditional route to Mombasa by road.

Route no.8 was recently opened in February 1986 (see section 4.3 and appendix IV) when Kenya Railways Marine Services re-launched rail-wagon ferry UHURU on Lake Victoria. This route (Kigali - Bukoba - Kisumu - Mombasa) as illustrated in Figures 1 and 6 involves road/lake/road as:

(i) Trucks travel by road (kigali - Bukoba) or vice versa,

(ii) Trucks are ferried across Lake Victoria (Bukoba - Kisumu) or vice versa by the KR wagon ferry, and

(iii) Trucks travel by road (Kisumu - Mombasa) or vice versa.

A comparison of transportation cost per tonne of containerised consignments in US$ extracted from tables 13 and 14 is given below for the two routes.

Route Number	Mode	Export Coffee	Motor Vehicle Spares
6	Road	228.58	333.98
8	Road/lake/road	200.45	287.03

It can be seen from above that for export coffee, the savings per tonne on transportation cost for using

route no.8 instead of 6 is US$ 28.13 and for import motor vehicle spares, the corresponsing savings is US$ 46.95.

Given the fact that Rwanda's basic hindrance to economic growth is high transportation costs and that coffee accounts for 60% of total foreign exchange export earnings; machinery, tools and transport equipment 27% of total import value (see section 2.5), any savings made on transportation costs would have a positive contribution to the country's balance of payments. Inland transportation costs on route no.6 takes 8.16% of the value of coffee and 12.6% of the value of motor vehicle spares. Using route no.8, it takes 7.16% and 10.83% of the value of coffee and motor vehicle spares respectively. The following inference may be made:

(1) The average annual coffee exports for Rwanda between 1979-82 derived from Figure 3 is 24,750 tonnes. If all this coffee was moved to Mombasa using route no.8 instead of 6, the savings on transportation costs would be approximately

= 24,750 x 28.13

= 0.7 million US$/year.

(2) Table 2 shows the annual value of exports and imports of all merchandise trade for the East African countries for the period 1973-

82. From this table, it can be derived that the average annual total import value for Rwanda between 1979-82 is US$ 244 million. Assuming that motor vehicle spares transport costs are same as all other machinery, tools and transport equipment (which accounts for 27% of total import value), the savings on transportation costs for using route no.8 instead of 6 for this imports can be calculated as:

$$\text{savings} = \frac{27}{100} \times \frac{244(12.6-10.83)}{100}$$

$$= 1.17 \text{ million US\$/year}$$

At present, since Rwanda has no railways, most of her external trade will continue using either route no.6 by road to Mombasa or shorten this distance by using route no.8 combining inland waterways on Lake Victoria and the road. Route no.8 which is more economical as proved above is however based on assumption that Kenya Railways Marine Services will provide and operate the rail-wagon ferry UHURU on the Lake between Kisumu and Bukoba. The average annual Rwanda transit cargo through the Northern Corridor (table 7) is 116,243 tonnes. This volume of traffic would justify provision of the ferry on full time basis, only that it will be carrying trucks across Kisumu - Bukoba instead of rail wagons that it

was designed for. The volume of traffic would also be increased if consideration was given to the transit cargo from Zaire and Burundi (Appendix IV).

An important point to be noted is that protocol no.2 on "Transit Routes and Facilities" of the Northern Corridor Agreement (see Appendix I(2)) Article 3 does not include this route no.8 (kigali - Bukoba - Kisumu - Mombasa). For the route to be more effective, amendments to the protocol will be necessary.

7.2.4 Burundi Traffic

Tables 13 and 14 show that Burundi has five alternative routes (nos.13 to 17) to the seaports. Routes no.13 to 16 go through the Northern Corridor to Mombasa whereas only route no.17 goes through the Central Corridor to Dar es Salaam. It was stated in section 2.6 that Burundi's quickest and most economical route is through Dar es Salaam but problems of congestion at Kigoma and Dar es Salaam ports, force the use of the longer, more expensive, but more efficient Mombasa outlet. An observation of tables 13 and 14 confirm that route no.17 is the most economical whilst route no.13 by road is the most expensive.

Present Routes for Burundi Traffic

Analysis and derivations from tables 7 and 10 show that the annual average of total Burundi transit cargo through Mombasa and Dar es Salaam are 28,066 tonnes (26%) and 80,834 tonnes (74%) respectively. Since route no.17 is the quickest and most economical route, and it takes 74% of Burundi's external trade, no further comments will be made on it. Of the 28,066 tonnes of transit cargo through Mombasa, 97% is imports and only 3% is exports. This means that all the Burundi coffee exports, which accounts for 90% of the country's export earnings, use the economical route no.17.

Any improvements on transportation of Burundi's external trade would therefore have to be considered on the Northern Corridor through Mombasa as shown in table 14 for imports. Route nos.14 and 16 consists of road/rail and road/lake/rail respectively and are extensions of route nos.7 and 9 for the Rwanda traffic in that order. As mentioned in section 7.2.3, these routes can only be practical if the policies of Uganda and Kenya Governments of shifting long distance freight to rail are implemented. That leaves route nos.13 and 15 for comparison of user costs.

For route no.13, the trucks drive from Mombasa to

Bujumbura by road via Kampala carrying import motor vehicle spares while for route no.15 the mode is as follows:

(i) Trucks travel by road (Mombasa - Kisumu),

(ii) Trucks are ferried across (Kisumu - Bukoba) by the KR wagon ferry on Lake Victoria, and

(iii) Trucks travel by road (Bukoba - Bujumbura).

The transportation cost per tonne for containerised motor vehicle spares given in table 14 using route nos. 13 and 15 is US$ 378.21 (14.3% of the value) and US$ 331.25 (12.5% of the value) respectively. The savings on transportation costs by using route no.15 involving inland waterways on Lake Victoria instead of route no. 13 is US$ 46.96 per tonne.

It was stated in section 2.6 that Burundi's major problems are high transportation costs of external trade and lack of efficient routes to the seaports. Also oil imports takes about 45% of Burundi coffee earnings and in 1983, the price of oil in Burundi reached US$ 100 due to high transportation costs. Therefore the net effect of total savings on transportation costs accrued by using route no.15 would have substantial contribution to the country's balance of payments. The 28,066 tonnes of Burundi's transit cargo through the Northern

Corridor would in fact be an additional traffic volume to Rwanda's for the lake rail-wagon ferry between Kisumu and Bukoba.

However it should be emphasized that the savings on transportation costs due to utilization of inland waterways on Lake Victoria for Uganda, Rwanda and Burundi transit cargo traffic must not be extra profit for the transport operators but should be passed on to or shared with the users.

CHAPTER VIII

SUMMARY AND RECOMMENDATIONS

This study has considered and analysed economy, trade and inland transportation modes in the five East African countries, namely Kenya, Tanzania, Uganda, Rwanda and Burundi. The last three countries are land-locked and have to depend on the other two for their transit cargo to reach overseas markets. An examination of the economies of these countries revealed that they all have the following things in common:

- high population growth rate;
- agriculture as the base of the economy both subsistance and foreign exchange earnings;
- major export commodities - coffee, tea, cotton;
- inadequate inland transportation infrastructure, hence high transportation costs; and
- major import items, oil, machinery and transport equipment.

Three Indian Ocean seaports - Mombasa, Dar es Salaam and Tanga were identified as the outlets for regional external trade, and they are classified into two corridors for transit cargo. Mombasa is the outlet port for

the Northern Corridor and it handles 72% of the region's traffic. Dar es Salaam and Tanga are the outlet ports for the Central Corridor and handle 25% and 3% of the region's traffic respectively. These ports are connected to the hinterland by rail, road and also a combination of road/rail/inland waterways on Lakes Victoria and Tanganyika in any order.

Historical observation of the transportation system in East Africa revealed that railways were built inland from the seaports beginning from 1893. Between 1948 and 1967, there was a coordinated service in the region of rail, harbours and inland waterways operated by the defunct East African Railways and Harbours Corporation. This was later split into two - East African Railways and East African Harbours Corporations. The former was responsible for all rail and inland waterways service in the region whilst the latter was responsible for the seaports along the East African coast. The system worked well until 1977 (which was a turning point) when the East African Community broke up resulting into division of Railways into three statutory corporations (Kenya, Tanzania and Uganda Railways), and harbours into two statutory corporations (Kenya Ports Authority and Tanzania Harbours Authority). The most affected as a result of the break up of the Community was the inland waterways on Lake Victoria due to the fact that

the main Lake ports of Kisumu, Mwanza, Jinja and Bukoba were designed and built to link with rail and seaports as an integral system. The marine services on the lakes also used to operate under one Inland Waterways Act.

In view of the above, some vital marine operations on the Lake linked with railways were discontinued and some vessels laid up due to limitations of services on the Lake to territorial waters of Kenya, Uganda and Tanzania. The average age of the Kenyan and Tanzania fleet on the Lake was found to be 40 and 20 years respectively. The re-launching of the Kenya Railways wagon ferry UHURU in February 1986 after lay up of nine years was a significant step as it cut down the road distances for the transit cargo of the land-locked countries. The Uganda Railways decision in 1982 to build three wagon ferries for operation on the Central Corridor between Jinja and Mwanza created over capacity on that route and alternative routes ought to be sought if the ferries have to be utilized optimally . Tanzania Railways Marine Services on Lake Victoria is well developed and its Inland Waterways Act is already incorporated with the Merchant Shipping Act. The importance of Kenya Railways Marine Services on the Lake adopting same system as Tanzania was highlighted if improvements and rehabilitations have to be done.

Because seaports are links in the chain between inland transport and sea transport systems, the role of the East African seaports and their hinterland relations was examined in chapter five. It was found that on the Northern Corridor route through Mombasa port, road transport has overtaken rail in the haulage of transit cargo for Uganda, Rwanda and Burundi. This is so in spite of the policies of Kenya and Uganda Governments to shift long distance freight from road to rail necessitated by high maintenance costs of roads. The roads were found to be taking a bigger portion of the freight mainly due to:

- Road operators being more aggressive and flexible,
- Strong transport associations formed by road operators presenting pressure groups to rail,
- Rail having poor locomotive/wagon availability and turn round times, and
- Lack of adequate rail capacity and infrastructure especially for carriage of containers.

To overcome above shortcomings, the Railways were adopting a series of measures to win back freight from road such as: Procurement of rolling stock, replacement of steam with diesel engines, construction of Inland Container Depots in a number of stations, introduction of unit train concept and utilization of inland waterways

on Lake Victoria.

A general survey of economic aspects of rail, road and inland waterways transport in the world demonstrated that several elements determine the user choice of transport mode especially quality of service and efficiency of ports. It was highlighted that even though railroads have a comparative advantage over roads for long distance haulage, highways have been constructed parallel to railways in many countries in the world, developed and developing, and these highways have given keen competition to rail haulage. The main reasons given for this general modal shift from rail to roads were found to be: Inherent inflexibility of rail compared to roads and deterioration of quality of service rendered by rail especially in developing countries. With the coming of containerisation, the unit train concept has evolved to eliminate the inherent inflexibility. Roads were proved to have advantages and to be cheaper for shorter freight haulage.

From the energy consumption point of view, inland waterways barge was proved to be the most efficient in comparison with rail and road trucks. United States provided an excellent example of the importance of inland waterways transportation system. Its industrial growth was stimulated and promoted by the development of its

waterways and harbours. Analysis of transportation cost per tonne of cargo on Lake Victoria inland waterways was also found to be lower than either rail or road.

In chapter seven, a comparison of inland transportation tariff per TEU of containerised coffee in East Africa for rival modes of transport (rail, road and inland waterways) showed that for a distance of haul up to 230 km, road was cheaper than rail. Beyond 230 km, which was found to be the break-even point, rail haulage had a comparative advantage over road.

In view of the above evaluation, a comparison of inland transport user costs and routes for the transit cargo of Uganda, Rwanda and Burundi on the two corridors was made and tabulated in tables 13 and 14. The following conclusions and revelations were derived:

- for Uganda traffic, 236,182 tonnes go through Mombasa and 25,810 tonnes through Dar es Salaam averagely per annum. Most of the cargo through Mombasa go by road. If this cargo went by rail or rail/lake (Kampala - Jinja - Kisumu - Mombasa), millions of US dollars would be saved on transportation costs. The proposed route (Kampala - Jinja - Musoma - Mwanza) might prove more economical when implemented.

- for Rwanda traffic, the present route through Dar es Salaam would be most economical but because of congestion at Kigoma and Dar es Salaam ports, Rwanda has to use Mombasa for 95.6% of her traffic which represents an average of 116,243 tonnes per annum. The most economical route for Rwanda traffic is (Kigali - Bukoba - Kisumu - Mombasa) using road/lake/rail. This will however depend on Kenya Railways having adequate rolling stock for the Kisumu - Mombasa route. In the absence of that, the next best route is the same route but different modes, that is, road/lake/road. This is again subject to Kenya Railways providing a ferry service between Bukoba abd Kisumu on the Lake.
- for Burundi traffic, the shortest and most economical route is through Dar es Salaam and already 74% of her cargo uses this route. The remaining 26% representing 28,066 tonnes averagely per annum goes through Mombasa. The cheapest route for this traffic is (Bujumbura - Bukoba - Kisumu - Mombasa) using road/lake/road. This is again subject to Kenya Railways providing a ferry service as mentioned above.

Combination of inland waterways on Lake Victoria with

either rail or road transport modes would have considerable savings on transportation costs for the land-locked countries. The same economic forces that stimulated and promoted industrial development in the United States by the development of waterways can be employed with profit if the East African countries can utilize the inland waterways on Lake Victoria for transportation. This might be effectively achieved if some or all of the recommendations offered below could be adopted:

(1) Kenya Railways should maintain and operate wagon ferry service between Kisumu and Bukoba for ferrying road trucks loaded with Rwanda and Burundi transit cargo across. This route is more economical for the two land-locked countries and also the annual volume of transit cargo justify deployment of wagon ferry service. The Northern Corridor Transit Agreement Protocol no.2, should also be amended to include this route (Kisumu - Bukoba - Kigali - Bujumbura) among designated transit routes.

(2) Since the Central Corridor route for Uganda traffic (Jinja - Mwanza) already has over capacity with three new wagon ferries, Uganda Railways should consider transfering one or two of these ferries to the Jinja - Kisumu route (route no.3, tables 13 and 14).

This route is shorter than the direct rail route from Kampala to Mombasa and can be more economical if the policies of Kenya and Uganda Governments of long distance modal shift from road to rail are implemented. It would also be more logical for Uganda Railways to charge the same tariff for Lake transport as for the rail because savings on transportation costs due to utilization of inland waterways would offset capital charges for the ferries.

(3) If the above recommendations were adopted, then the transit cargo volume for Uganda, Rwanda and Burundi justify introduction of unit train concept "RAILTAINER" between Mombasa seaport and Kisumu lake port by Kenya Railways. Another advantage of this is that Kisumu would act as one customs control point for all the three land-locked countries' transit traffic as well as a transhipment point for rail/lake/road transport modes.

(4) Serious consideration should be given about building Inland Container Depots (ICD) at the major Lake Victoria ports of Kisumu, Bukoba, Mwanza and Jinja or Port Bell, in view of the fact that more and more external

trade is being containerised.

(5) Since Lake Victoria is shared amongst Kenya, Tanzania and Uganda, and historically the inland waterways Act was one, steps should be taken by the three Railways Corporations in the respective countries towards a unified system of regulations concerning manning, surveys, inspections and safety of ships.

(6) As the barge transport system is the most efficient for inland waterways, future investments in lake transportation should consider adopting this system instead of only rail-wagon ferries.

TABLES

TABLE 1

BASIC ECONOMIC INDICATORS FOR THE EAST AFRICAN COUNTRIES.

COUNTRY/PARTICULARS	BURUNDI	KENYA	RWANDA	UGANDA	TANZANIA	TOTAL E.AFRICA
Area (sq.km)	27,830	580,370	26,340	241,140	945,090	1,820,770
Population,1982 (million)	4.3	18.1	5.5	13.5	19.8	61.2
Birth Rate p.a. %	2.6	4.0	3.0	3.0	3.25	3.17
Population*,2000 (million)	7.0	36.7	9.4	23.0	35.2	111.3
GNP/Capita US$	280	390	260	230	280	288

* Author's projected estimates.

Source: Data from 1984 World Development Report, World Bank.

TABLE 2

VALUE OF EXPORTS AND IMPORTS OF ALL MERCHANDISE TRADE FOR THE EAST AFRICAN COUNTRIES, 1973-82 (in million US$).

YEAR	BURUNDI		KENYA		RWANDA		UGANDA		TANZANIA	
	imports	exports	imports	exports	imports	exports	imports	exports	imports	exports
1973	31	31	655	516	31	35	163	313	497	368
1974	43	32	1075	660	58	37	218	326	736	400
1975	62	33	980	644	96	48	200	275	773	372
1976	65	68	973	825	103	90	170	359	646	490
1977	74	95	1284	1195	114	102	190	610	748	543
1978	98	69	1710	1022	179	85	192	360	1143	468
1979	152	104	1657	1107	192	120	167	440	1077	511
1980	168	65	2588	1389	243	76	293	360	1226	508
1981	167	71	2069	1188	256	88	250	280	1152	566
1982	214	88	1683	979	286	90	270	450	940	550

Source: UNCTAD Yearbook of International Commodity Statistics, 1984.

TABLE 3

KENYA RAILWAYS FLEET ON LAKE VICTORIA.

NAME OF VESSEL	TYPE	BUILT	LENGTH (m)	BREADTH (m)	POWER (K.W)	SPEED (knots)	CAPACITY OR NO. of pass.
M.V. UHURU	Wagon ferry	1967	91.80	16.50	2061	13	42 rail wagons
S.S.NYANZA	General cargo	1907	67.10	10.67	-	-	N.A
M.V.KAMONGO	Passenger	1977	32.80	7.01	110	6	232
M.V. RELI	Passenger	1947	29.90	5.49	265	9	136
M.V. ALESTES	Passenger	1957	25.90	6.10	280	9	200
S.S. KAVIRONDO	Tug (barge)	1912	30.50	6.40	294	4.5 tow	120 ton x 6
M.V. HOMA	Tug (barge)	1937	25.90	4.89	221	N.A	120 ton x 1
M.V. PEEDA	Launch	N.A	14.30	3.14	N.A	N.A	N.A
M.V. KATHLEEN	Launch	N.A	9.80	3.96	N.A	N.A	N.A
	Lighters (6)	1937	32.00	7.32	-	-	120 ton x 6
	Lighters (3)	1937	24.40	5.46	-	-	65 ton x 3

N.A Not available.

Source: Kenya Railways Headquarters, Nairobi.

TABLE 4

TANZANIA RAILWAYS FLEET ON LAKE VICTORIA.

NAME OF VESSEL	TYPE	BUILT	GRT	POWER (K.W)	SPEED (knots)	CAPACITY OR NO. of passengers
VICTORIA	Passenger	1961	1600	1678	N.A	750
BUKOBA	Passenger	1980	800	762	N.A	400
CLARIAS	Passenger	1960	200	500	N.A	290
BUTIAMA	Passenger	1980	500	634	N.A	200
UMOJA	Wagon ferry	1960	1600	2000	11.5	42 wagons
NG'OMBE	Cargo	1960	200	200	N.A	N.A
MAINDI	Cargo	1955	150	100	N.A	N.A
WINBI	Cargo	1955	150	100	N.A	N.A
NYANGUMI	Tanker	1960	300	400	N.A	N.A
UKEREWE	Tanker	1983	100	634	N.A	N.A

N.A - Not available.

Source: Report on Tanzanian Maritime Training. E. Jacobsen, 1985.

TABLE 5

UGANDA RAILWAYS FLEET ON LAKE VICTORIA.

NAME OF VESSEL	TYPE	BUILT	GRT	POWER (K.W)	SPEED (knots)	CAPACITY
M.V. KAAWA	Wagon ferry	1983	1600	1678	13	44 single wagons
M.V. KABALEGA	"ditto"	1985	"ditto"	"ditto"	"ditto"	"ditto"
M.V. PAMBA	"ditto"	1985	"ditto"	"ditto"	"ditto"	"ditto"
N.A.	Service launch	1983	N.A.	N.A.	N.A.	N.A.

N.A. Not available.

Source: Belgian Shipbuilders Corporation V.L.U. (Antwerp).

TABLE 6

CARGO THROUGHPUT AT MOMBASA PORT, 1979-85.

YEAR	'000 Tonnes				CONTAINERS TEU
	IMPORTS	EXPORTS	TRANS-SHIPMENT	TOTAL	
1979	3,859	2,078	5	5,942	15,149
1980	5,472	2,037	4	7,512	30,660
1981	5,627	2,806	3	8,436	44,084
1982	4,192	2,364	5	6,561	57,645
1983	4,288	2,196	10	6,494	83,855
1984	4,474	2,059	16	6,549	92,463
1985	4,437	1,878	25	6,340	N.A.

N.A. Not available.

Source: Annual Bulletin of Port Statistics, KPA 1985.

TABLE 7

TRANSIT CARGO THROUGH MOMBASA PORT, 1979-85. (Tonnes)

	1979	1980	1981	1982	1983	1984	1985
UGANDA							
Imports	82,279	112,103	49,875	86,759	125,335	97,200	60,149
Exports	143,748	115,409	131,847	169,824	155,648	158,903	164,193
Total	226,027	227,511	181,722	256,583	280,985	256,103	224,342
RWANDA							
Imports	69,804	56,592	79,945	89,007	77,498	119,100	56,166
Exports	47,055	30,959	38,826	35,776	37,379	37,464	38,132
Total	116,859	87,551	118,771	124,783	114,877	156,564	94,298
BURUNDI							
Imports	20,049	16,751	23,772	44,560	37,218	27,811	20,159
Exports	415	158	83	1,807	886	1,132	1,658
Total	20,464	16,909	23,855	46,367	38,104	28,943	21,817
GRAND TOTAL	363,350	331,971	324,348	427,733	433,966	441,610	340,457

Source: Monthly Review of Port Working - KPA.

TABLE 8

CARGO THROUGHPUT AT DAR ES SALAAM PORT, 1979-85.

YEAR	'000 Tonnes				CONTAINERS TEU
	IMPORTS	EXPORTS	TRANS-SHIPMENT	TOTAL	
1979	915	760	-	1,675	4,354
1980	1,153	707	-	1,860	9,275
1981	2,568	772	-	3,340	18,014
1982	1,082	283	-	1,365	26,298
1983	1,498	602	-	2,100	28,000
1984	2,496	896	-	3,392	30,540
1985	2,011	747	-	2,758	34,000

Source: Monthly Review of Port Working - THA Traffic Department.

TABLE 9

CARGO THROUGHPUT AT TANGA PORT, 1979-85.

YEAR	Tonnes				CONTAINERS TEU
	IMPORTS	EXPORTS	TRANS-SHIPMENT	TOTAL	
1979	118,300	192,110	-	310,410	-
1980	239,966	143,765	-	383,731	49
1981	155,706	156,157	-	311,863	129
1982	108,684	160,338	-	269,022	2,754
1983	91,482	96,775	-	188,257	4,473
1984	107,294	111,614	-	218,908	4,987
1985	124,552	133,316	-	257,869	5,710

Source: Port Managers Monthly Review of Port Working.

TABLE 10

TRANSIT CARGO THROUGH DAR ES SALAAM PORT, 1979-85. (Tonnes)

	1979	1980	1981	1982	1983	1984	1985
UGANDA							
Imports	-	-	-	-	20,700	28,160	8,400
Exports	-	-	-	-	-	3,670	16,500
Total	-	-	-	-	20,700	31,830	24,900
RWANDA							
Imports	3,141	1,317	666	1,500	5,200	1,180	12,300
Exports	1,340	1,584	908	300	200	225	7,400
Total	4,481	2,901	1,568	1,800	5,400	1,405	19,700
BURUNDI							
Imports	45,512	42,995	38,604	36,700	30,800	23,360	36,870
Exports	27,380	18,765	30,379	32,300	32,100	31,950	25,440
Total	72,892	61,760	68,983	69,000	62,900	53,310	62,310
GRAND TOTAL	77,373	64,661	70,551	70,800	89,000	86,545	106,910

Source: Monthly Review of Port Working - THA.

TABLE 11

MOMBASA PORT DUES, CLEARING AND FORWARDING CHARGES.
(In US$ per tonne December 1985)

	EXPORTS (coffee)		IMPORTS (vehicle spares)	
	Container-ised	Bagged	Container-ised	Break-Bulk
PORT DUES				
Wharfage	22.40	22.40	26.50	26.50
Stevedoring	2.90	4.06	3.75	4.06
Handling	1.12	1.12	2.18	2.18
Storage	-	-	4.38	4.38
Sub total	26.42	27.58	36.81	37.12
C&F				
Agency	-	-	26.50	26.50
Documentation	-	-	0.35	0.35
Bond fee	28.00	28.00	26.50	26.50
Sub total	28.00	28.00	53.35	53.35
GRAND TOTAL	54.42	55.58	90.16	90.47

Source: Author's estimates.

TABLE 12

DAR ES SALAAM PORT DUES, CLEARING AND FORWARDING CHARGES.
(In US$ per tonne December 1985)

	EXPORTS (coffee)		IMPORTS (vehicle spares)	
	Containerised	Bagged	Containerised	Break-Bulk
PORT DUES				
Wharfage	28.00	28.00	33.13	33.13
Stevedoring	2.66	2.85	3.78	2.85
Handling	1.82	1.96	1.29	1.96
Storage	5.32	3.10	7.52	3.10
Sub total	37.80	35.91	45.72	41.04
C&F				
Agency	-	-	26.50	26.50
Documentation	-	-	0.35	0.35
Bond fee	28.00	28.00	26.50	26.50
Sub total	28.00	28.00	53.35	53.35
GRAND TOTAL	65.80	63.91	99.07	94.39

NOTE: The above charges are also applicable to Tanga port.

Source: Author's estimates.

TABLE 13
COMPARISON OF ROUTES AND INLAND TRANSPORT USER COSTS FOR EXPORT COFFEE ON THE NORTHERN AND CENTRAL CORRIDORS.

	Route	Length (km)	Method of transport	Transit countries and corridor	EXPORTS cost estimate US$/tonne (coffee)	
					Containerised	Bagged
	UGANDA TRAFFIC					
1.	KMP-MBSA	1149	road	1 N	173.92	175.08
2.	KMP-MBSA	1336	rail	1 N	99.07	102.92
3.	KMP-JINJA-KSM-MBSA	1263	rail+lake+rail	1 N	111.00	110.02
4.	KMP-JINJA-MZA-DSM	1672	rail+lake+rail	1 C	125.01	123.12
5.	KMP-JINJA-MSMA-TNGA	1157*	rail+lake+rail	1 C	114.66	112.77
	RWANDA TRAFFIC					
6.	KGL-MBSA	1665	road	2 N	228.58	229.74
7.	KGL-KMP-MBSA	1845	road+rail	2 N	152.39	156.24
8.	KGL-BKB-KSM-MBSA	1595	road+lake+road	3 N	200.45	190.76
9.	KGL-BKB-KSM-MBSA	1682	road+lake+rail	3 N	139.78	151.01
10.	KGL-BKB-MSMA-TNGA	1435*	road+lake+rail	2 C	145.00	143.11
11.	KGL-BKB-MSMA-TNGA	1305*	rail+lake+rail	2 C	120.99	119.10
12.	KGL-BUJA-KGM-DSM	1732	road+lake+rail	2 C	136.37	134.48
	BURUNDI TRAFFIC					
13.	BUJA-MBSA	1967	road	3 N	260.17	261.33
14.	BUJA-KMP-MBSA	2147	road+rail	3 N	183.91	187.76
15.	BUJA-BKB-KSM-MBSA	1897	road+lake+road	4 N	232.04	222.35
16.	BUJA-BKB-KSM-MBSA	1984	road+lake+rail	4 N	180.52	182.60
17.	BUJA-KGM-DSM	1430	lake+rail	1 C	104.79	102.90

* Proposed project and route.
Source: Author's estimates.

Note: See page xi for abbreviations and notations used.

TABLE 14
COMPARISON OF ROUTES AND INLAND TRANSPORT USER COSTS FOR IMPORT MOTOR VEHICLE SPARES ON THE NORTHERN AND CENTRAL CORRIDORS.

	Route	Length (km)	Method of transport	Transit countries and corridor	IMPORTS cost estimate US$/tonne (motor vehicle spares)	
					Containerised	Break bulk
	UGANDA TRAFFIC					
1.	KMP-MBSA	1149	road	1 N	257.46	232.68
2.	KMP-MBSA	1336	rail	1 N	152.67	159.31
3.	KMP-JNJA-KSM-MBSA	1263	rail+lake+rail	1 N	159.83	173.86
4.	KMP-JNJA-MZA-DSM	1672	rail+lake+rail	1 C	172.64	179.71
5.	KMP-JNJA-MSMA-TNGA	1157*	rail+lake+rail	1 C	159.72	167.07
	RWANDA TRAFFIC					
6.	KGL-MBSA	1665	road	2 N	333.98	298.29
7.	KGL-KMP-MBSA	1845	road+rail	2 N	225.60	222.67
8.	KGL-BKB-KSM-MBSA	1595	road+lake+road	3 N	287.03	268.91
9.	KGL-BKB-KSM-MBSA	1682	road+lake+rail	3 N	200.60	184.50
10.	KGL-BKB-MSMA-TNGA	1435*	road+lake+rail	2 C	202.05	192.30
11.	KGL-BKB-MSMA-TNGA	1305*	rail+lake+rail	2 C	167.44	166.17
12.	KGL-BUJA-KGM-DSM	1732	road+lake+rail	2 C	193.30	180.77
	BURUNDI TRAFFIC					
13.	BUJA-MBSA	1967	road	3 N	378.21	335.31
14.	BUJA-KMP-MBSA	2147	road+rail	3 N	265.43	260.26
15.	BUJA-BKB-KSM-MBSA	1897	road+lake+road	4 N	331.25	304.45
16.	BUJA-BKB-KSM-MBSA	1984	road+lake+rail	4 N	257.64	222.09
17.	BUJA-KGM-DSM	1430	lake+rail	1 C	150.22	139.48

* Proposed project and route.
Source: Author's estimates.
Note: See page xi for abbreviations and notations used.

FIGURES

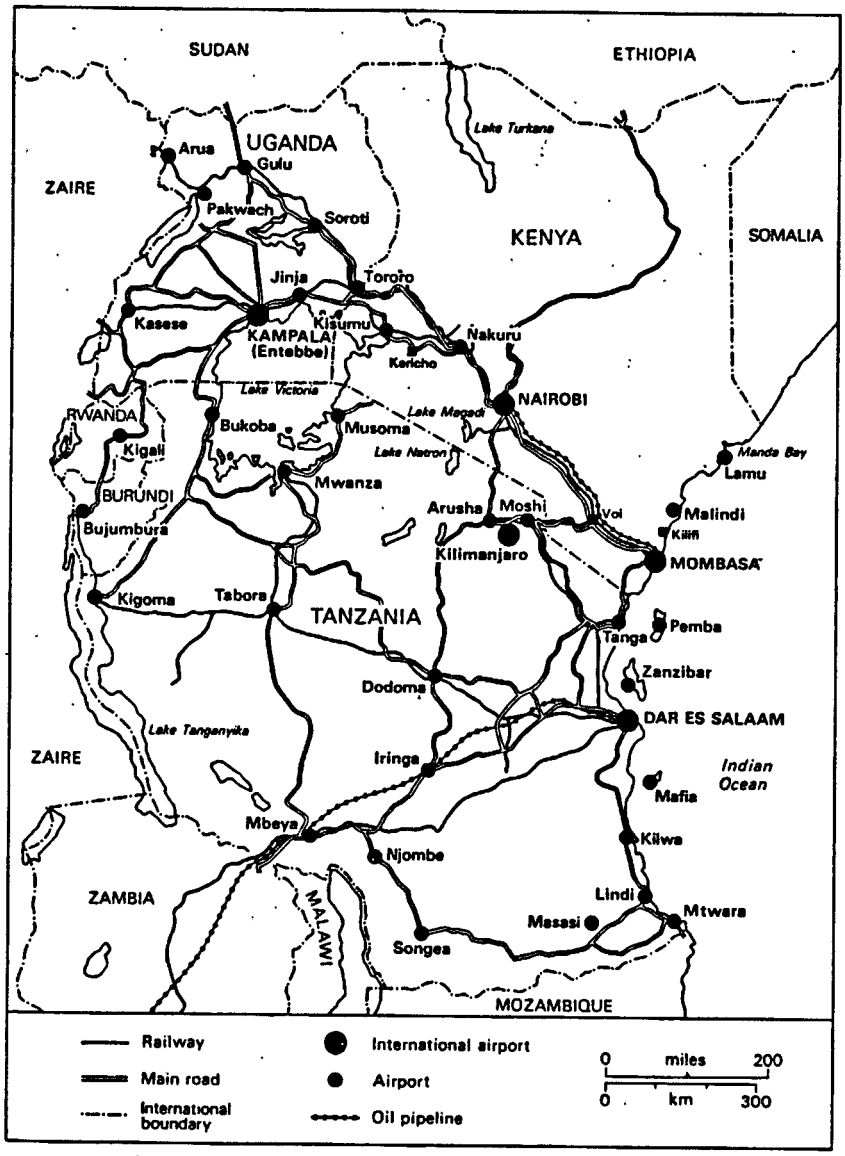


FIGURE 1. East African countries and Pattern of Transport Services.

Source: Hoyle, B.S.,Seaports and Development: The Experience of Kenya and Tanzania.

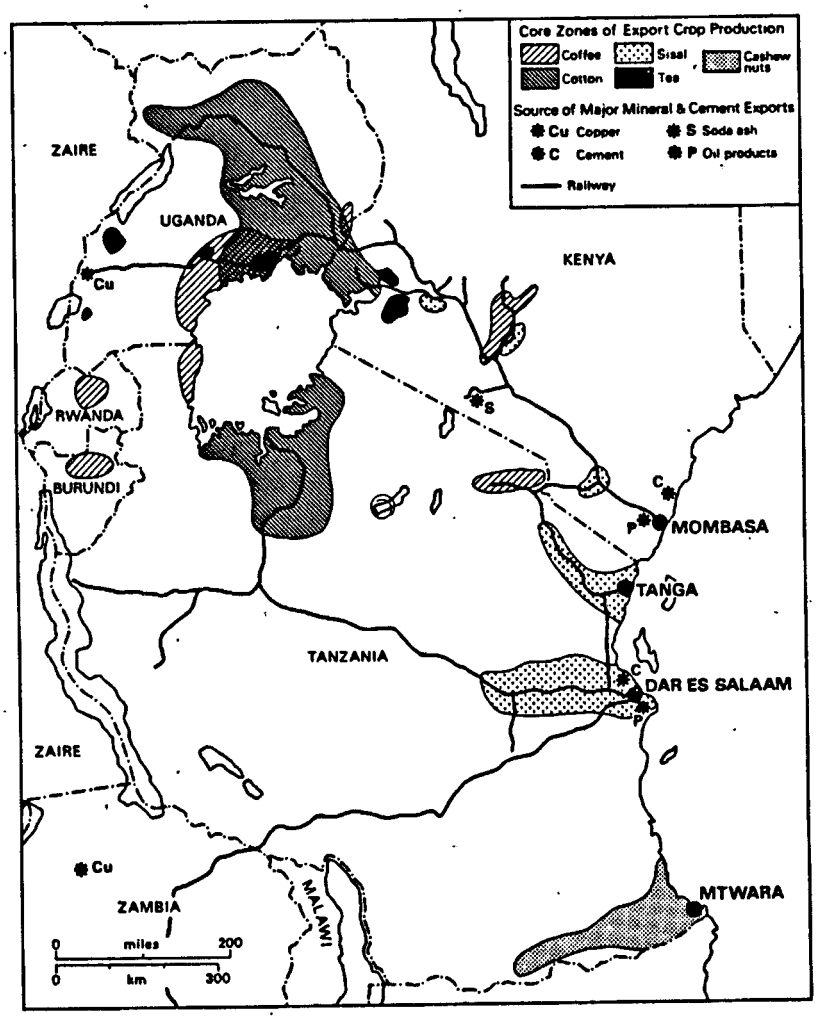


FIGURE 2. Economic Geography of the Hinterlands of East African Seaports.

Source: Hoyle, B.S.,Seaports and Development: The Experience of Kenya and Tanzania.

FIGURE 3. Annual Coffee Exports from East Africa.

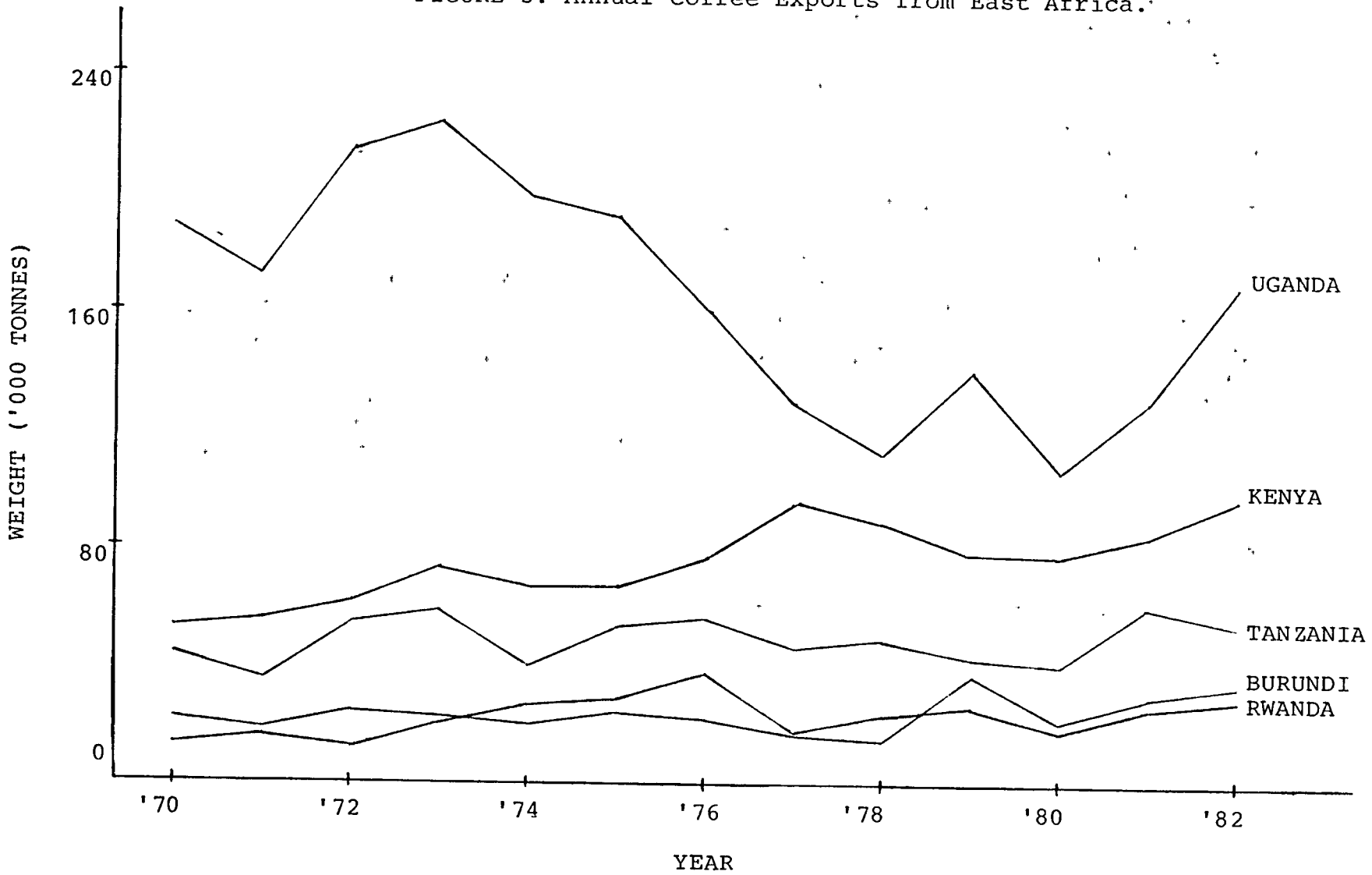


FIGURE 4. Annual Cotton Exports from East Africa.

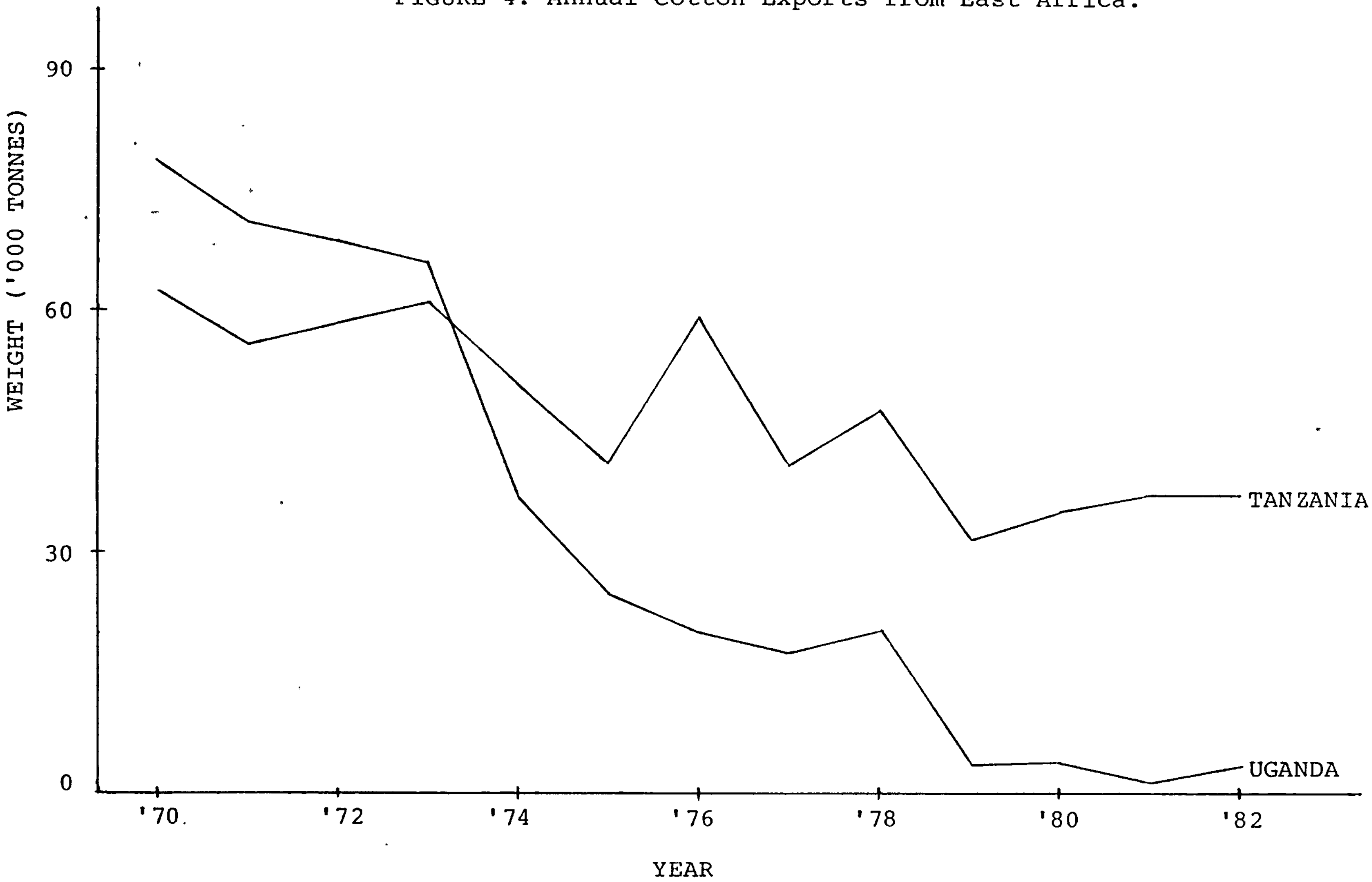
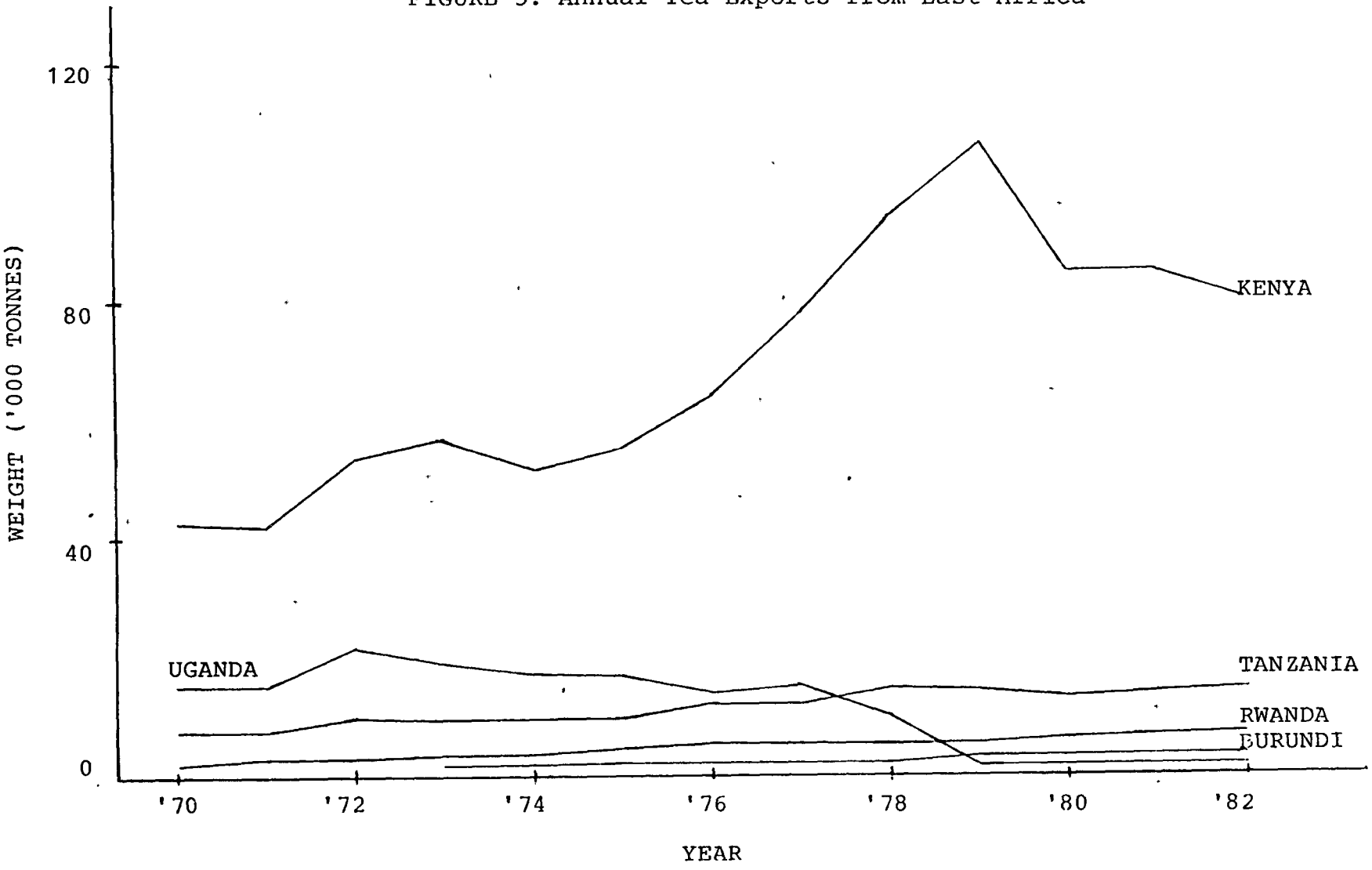


FIGURE 5. Annual Tea Exports from East Africa



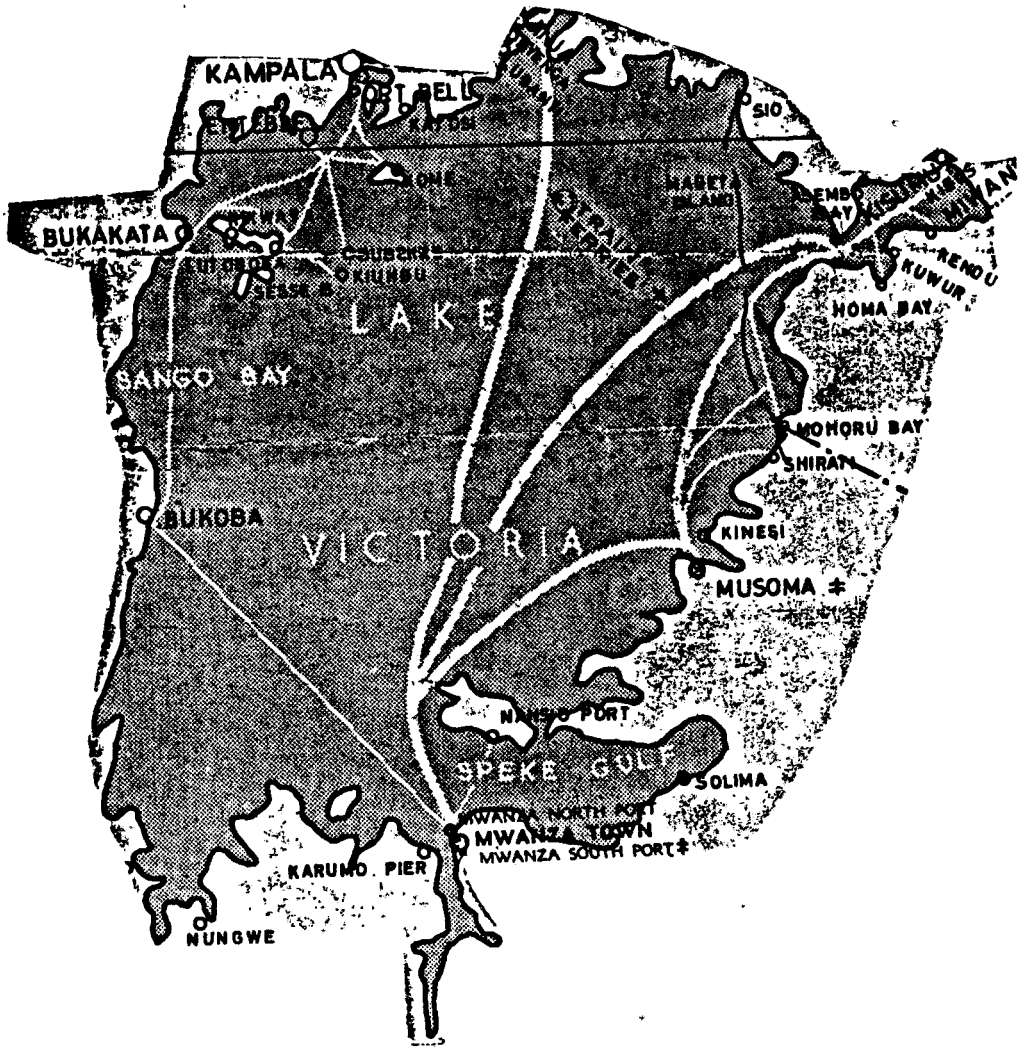
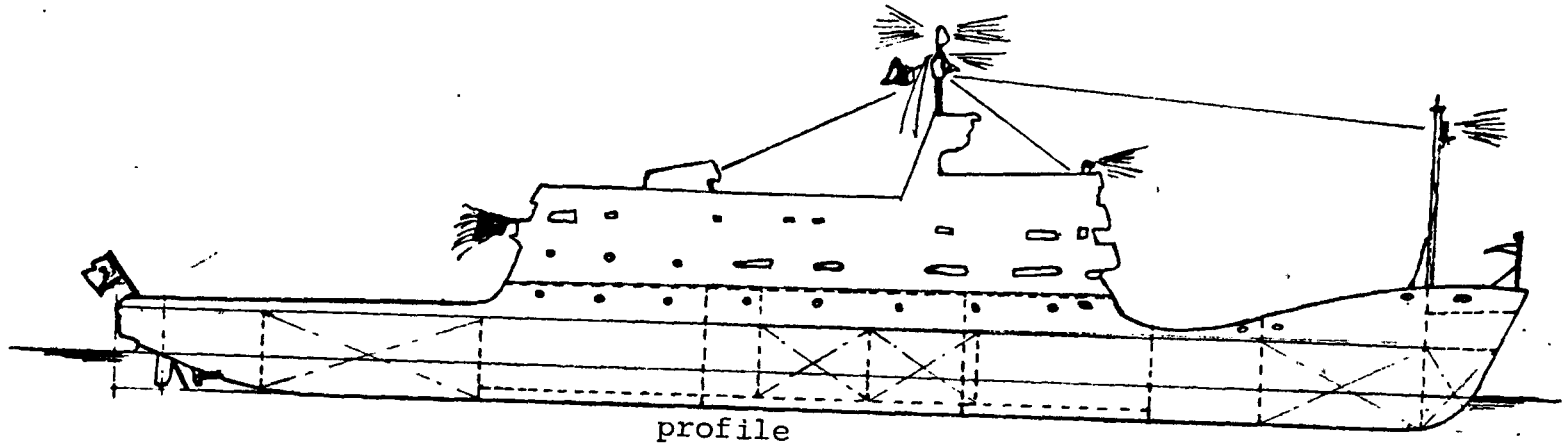


FIGURE 6. Lake Victoria Inland Waterways Routes and Ports.



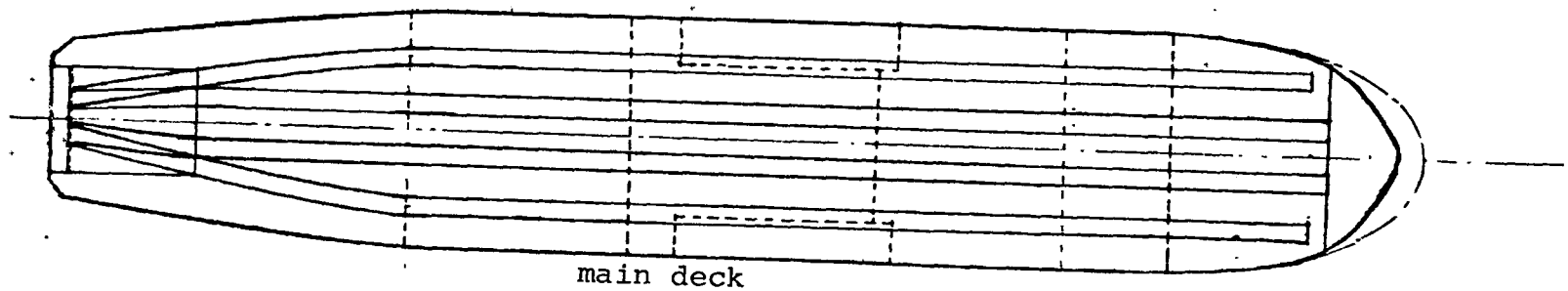


FIGURE 7. UMOJA Class Rail-Wagon Ferry.

MAIN PARTICULARS

Length overall	92.03 m	Max. speed	14 knots
Breadth moulded	16.47 m	Service speed	11.5 knots
Depth to main deck	4.27 m	Capacity	42 wagon on 4 railway tracks
Draft (loaded)	2.59 m	Machinery	Twin screw @ 1600 H.P. each.
Displacement	2,740 tonnes		

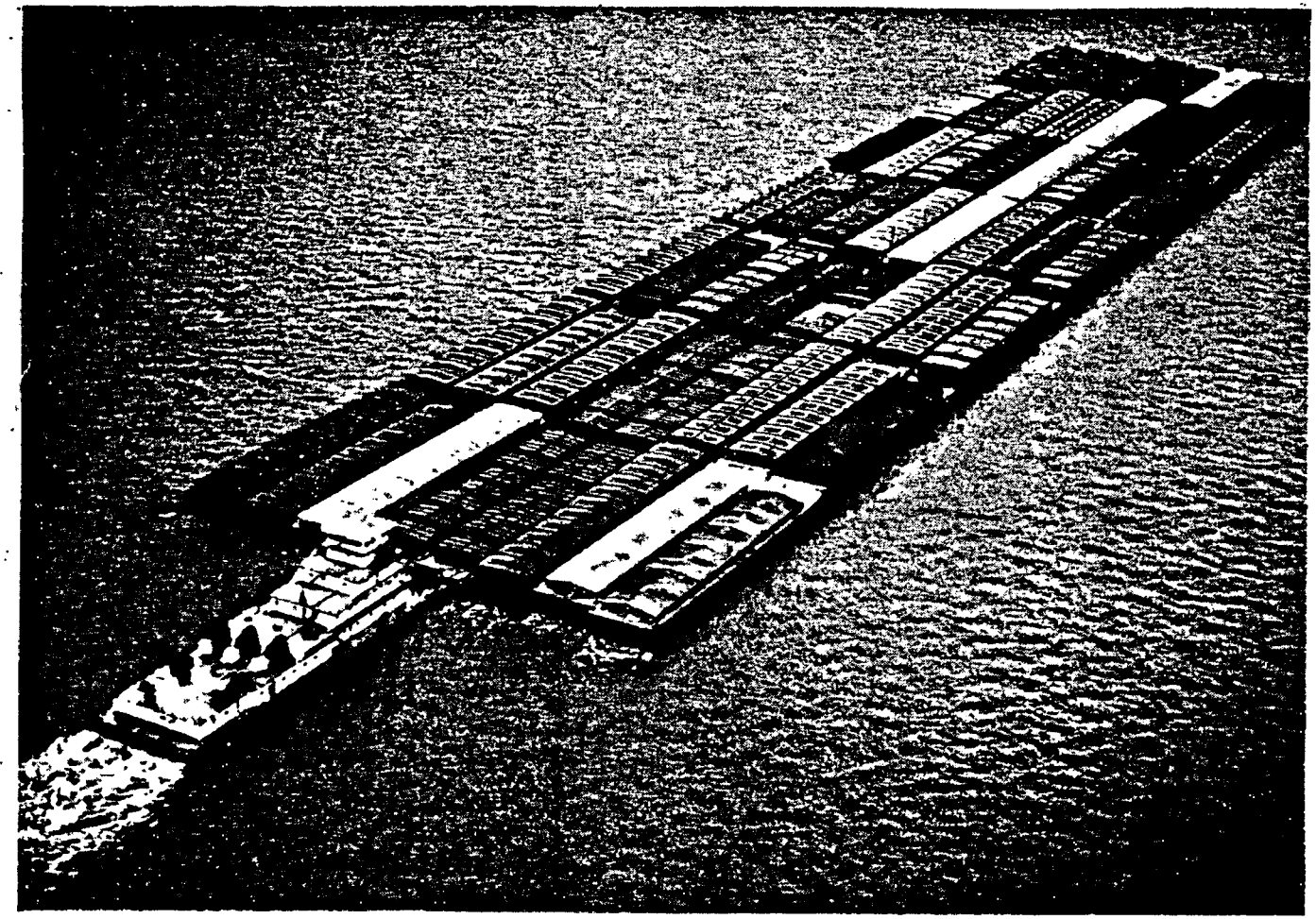


FIGURE 8. Typical Inland Waterways Towboat Pushing a Barge Train in North America.

FIG. 9. Graph of Inland Transportation Tariff per TEU of Containerised Coffee for Rival Modes against Length of Haul.

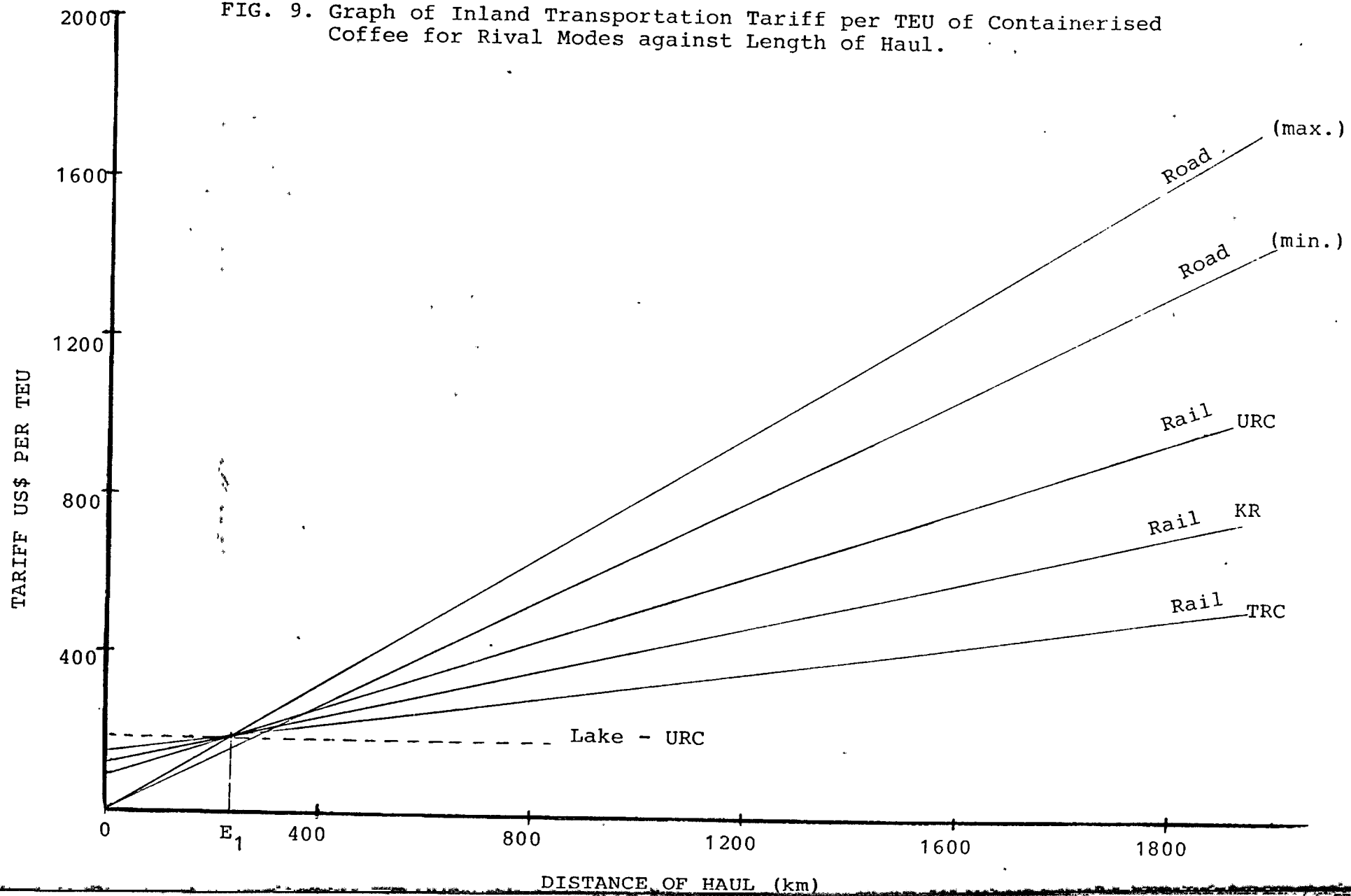
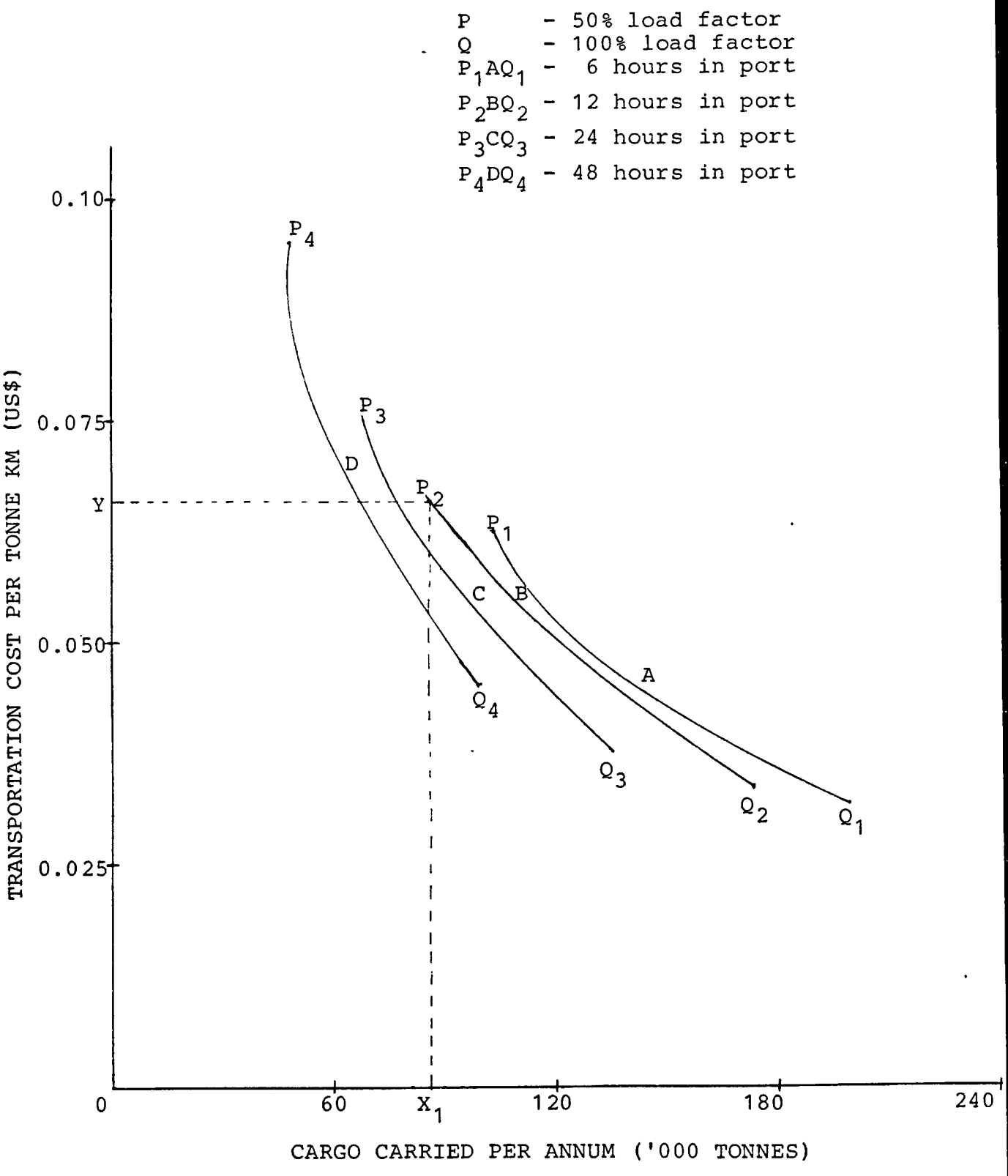


FIG. 10. Graph of Transportation Cost per Tonne Km against Cargo Carried per Annum for One URC Rail-Wagon Ferry.



APPENDICES

NORTHERN CORRIDOR TRANSIT AGREEMENT.

The Government of the Republic of Burundi,

the Government of the Republic of Kenya,

the Government of the Rwandese Republic, and

the Government of the Republic of Uganda,

hereafter referred to as the Contracting Parties,

ANIMATED by the desire to maintain, further develop and strengthen friendly relations and co-operation between their countries;

BEING AWARE of the growing interdependence of nations, regionally and internationally;

BEING OF THE VIEW that no country, whether land-locked or not, should be isolated from the rest of the world;

DESIROUS TO ENSURE the smooth and rapid movement of goods originating from or destined to a Contracting Party in transit through the territories of other Contracting Parties;

RECALLING the Treaty for the Establishment of the Preferential Trade Area for Eastern and Southern Africa (Lusaka, 1981) and the International Convention on Mutual Administrative Assistance for the Prevention, Investigation and Repression of Customs offences (Nairobi, 1977) to which they have subscribed;

TAKING INTO ACCOUNT the intentions and principles enunciated in the Convention and Statute on Freedom of Transit (Barcelona, 1921), the Convention on Transit Trade of Land-locked States (New York, 1965), the Customs Convention on Containers (Geneva, 1972), the Convention on the Simplification and Harmonization of Customs Procedures, (Kyoto, 1973), and the Convention on International Multimodal Transport of Goods (Geneva, 1980);

RECOGNIZING the importance of adequate transit traffic arrangements for the international trade and for the economic progress of land-locked States;

REITERATING their commitment to developing and maintaining a rational, co-ordinated and mutually beneficial system of transport and communications in the Northern Corridor;

have agreed as follows:

SECTION 1. PURPOSE AND OBJECTIVE

Article 1

The Contracting Parties agree that the Northern Corridor as defined in this Agreement provides a most effective route for the surface transport of goods between their respective countries and the sea and that the purpose of this Agreement is to promote its use.

The Contracting Parties agree to grant each other the right of tran sit in order to facilitate movement of goods through their respective territories and to provide all possible facilities for traffic in transit between them, in accordance with the provisions of this Agreement, its Annex and Protocols.

The Contracting Parties shall take all necessary measures:

(a) For the expeditious movement of traffic and for the avoidance of unnecessary delays in the movement of goods in transit through their territories;

(b) To minimize the incidence of Customs fraud and avoidance; and

(c) To bring about simplification and harmonization of documentation and procedures relevant to the movement of goods in transit.

SECTION 2. DEFINITIONS

Article 2

For the purpose of this Agreement, its Annex and Protocols the following terms and expressions shall have the meanings hereby assigned to them:

Border control services: Services of the Contracting Parties competent to carry out border controls, such as frontier police, Customs, plant protection and veterinary inspection services, and any other services as may be deemed necessary;

Carrier: A legal or natural person who is authorized in accordance with the national laws and regulations of the Contracting Parties to carry goods by rail or road, or any other mode of transport, for hire or reward or on own account;

Contracting Parties: With reference to this Agreement, its Annex and Protocols, Burundi, Kenya, Rwanda, Uganda and any other State acceding to this Agreement in accordance with Article 53;

Land-locked State: A State which has no sea coast or which does not have a direct link with the sea coast through its own territory;

Means of transport: A particular vehicle, railway wagon, vessel or other device used for the transport of goods or persons, including - where the local situation so requires - porters and pack animals;

Mode of transport: Method used for the movement of goods;

Northern Corridor: The transport infrastructure and facilities in East Africa served by the port of Mombasa in the Republic of Kenya;

Northern Corridor States: The countries utilizing the Northern Corridor;

Person: Natural and legal person, unless the context otherwise requires;

Rights of transit traffic in transit: Rights agreed between Contracting Parties for the passage of traffic across their territories;

Road Transport Permit: Document issued for a road vehicle by a Contracting Party to permit the vehicle to enter and leave, or pass in transit through, the territories of the Contracting Parties;

Traffic: Movement of means of transport and goods;

Traffic in transit: Passage of traffic across the territory of a Contracting Party with or without transhipment, warehousing, breaking bulk, cleaning, repairing, repacking, assembly, disassembly, reassembly of machinery and goods, and change of mode and means of transport when any such operation is undertaken solely for the convenience of transportation, provided that such a passage is only a portion

of a complete journey beginning and terminating beyond the frontier of the State across whose territory the traffic passes;

Transit: Passage across the territory of a Contracting Party when such passage is only a portion of a complete journey, beginning and terminating beyond the frontier of the State across whose territory the transit takes place;

Transit employee: Person employed by a carrier or other party engaged in traffic in transit;

Transit route: Land route or inland waterway designated by a Contracting Party within its territory for the passage of traffic in transit;

Transit State: State with or without sea coast, through whose territory traffic in transit passes;

Vehicle: Any power-driven vehicle which is constructed or adapted for use for the carriage of goods by road, and any trailer or semi-trailer designed to be drawn by such vehicles.

SECTION 3. RIGHT OF TRANSIT

Article 3

Each Contracting Party shall grant to the other Contracting Parties the right of transit through its territory, under the conditions specified in this Agreement and the provisions of its Protocols. The Contracting Parties shall provide each other with the facilities and guarantees required for this purpose.

Article 4

The Contracting Parties shall not exercise any discrimination with regard to the country of origin, consignment or final destination of the goods, or any circumstances relating to the ownership of goods, or the ownership or country of registration of means of transport used provided that goods originating or vehicles registered in South Africa shall not benefit from the transit facilities and privileges provided for in this Agreement.

SECTION 4. MARITIME PORT FACILITIES

Article 5

The Government of Kenya undertakes to provide, within its capabilities, the necessary maritime port facilities to the Northern Corridor States at the port of Mombasa, at costs and under conditions specified in the Protocol No. 1 to this Agreement on Maritime port facilities.

PROTOCOL NO. 2

TRANSIT ROUTES AND FACILITIES

Article 1: Application

Pursuant to Section 5 of the Northern Corridor Transit Agreement, the Contracting Parties agree to apply the provisions of this Protocol on Transit routes and facilities, which is an integral part of the Agreement.

Article 2: Content of the Protocol

In this Protocol, the Contracting Parties agree to designate the routes specified in Section 1 for use of the other Contracting Parties for their traffic in transit on their respective territories, to make available the facilities specified in Section 2 for use in connexion with such traffic, and to distribute the costs for construction, maintenance and repair of the transit routes as set out in Section 3 of the Protocol.

SECTION 1: DESIGNATION OF TRANSIT ROUTES

Article 3: Transit routes for road traffic

1. For the passage of traffic in transit by road through Kenya, the Government of Kenya designates the following roads:

From	By way of	To
Mombasa	Nairobi-Kisumu	Busia
Mombasa	Nairobi-Eldoret	Malaba

2. For the passage of traffic in transit by road through Uganda, the Government of Uganda designates the following roads:

From	By way of	To
Malaba	Jinja-Kampala-Masaka-Kabale	Katuna
Busia	Jinja-Kampala-Masaka-Kabale	Katuna
Kasese	Ishaka-Ntungamo	Kagitumba

3. For the passage of traffic in transit by road through Rwanda, the Government of Rwanda designates the following roads:

From	By way of	To
Kagitumba	Kigali-Butare	Upper Akanyaru
Gatuna	Kigali-Butare	Upper Akanyaru
Cyangugu		Bugarama
Cyanika	Ruhengeri	Gisenyi

4. For the passage of traffic in transit by road through Burundi, the Government of Burundi designates the following roads:

From	By way of	To
Upper Akanyaru	Kayanza-Bujumbura	Gatumba
Gisenyi	Kirundo-Ngozi	Bujumbura
Luhwa	Rugomba-Bujumbura	Upper Akanyaru

Article 4: Transit routes by rail

1. For the passage of traffic in transit by rail through Kenya, the Government of Kenya designates the following routes:

From	By way of	To
Mombasa	Nairobi-Eldoret	Malaba
Mombasa	Nairobi-Kisumu	Busia

2. For the passage of traffic in transit by rail through Uganda, the Government of Uganda designates the following routes:

From	By way of	To
Tororo	Jinja-Kampala	Kasese

Article 5: Customs approved routes and border crossing points

Routes approved by Customs for the passage of traffic in transit and Customs offices designated for clearance of such traffic are specified in the Protocol No 3 on Customs control to the Agreement.

SECTION 2: FACILITIES ALONG DESIGNATED TRANSIT ROUTES

Article 6: Facilities for road traffic

The Contracting Parties agree to make, whenever possible, the following facilities available for traffic in transit along the roads specified in Section 1 of this Protocol, against payment of costs for effects and provisions acquired and charges for the services rendered according to the rates that apply to the nationals of the country in which the facilities are used:

- First aid services and other assistance in the case of accidents;
- Repair facilities in case of break-down of vehicles;
- Fuel filling stations;
- Post and telecommunication offices;
- Facilities for loading, unloading, break bulk (where necessary);
- Storage areas and buildings; and
- Restaurants and stopover rest facilities.

Article 7: Facilities for rail traffic

The Government of Uganda agrees to make facilities for loading, unloading, breaking bulk (where necessary) and storage available for goods carried by rail

intended for Burundi and Rwanda and transferred to road transport, and vice versa, at the railway station in Kasese, against payment of costs for effects and provisions acquired and charges for the services rendered according to the rates that apply to Ugandan users.

SECTION 3: MAINTENANCE AND DISTRIBUTION OF COST

Article 8: Maintenance of transit routes

The Contracting Parties shall do everything possible to ensure that the routes within their territories designated in this Protocol for the passage of traffic in transit are safe, secure and in good condition, and undertake to effect any repairs necessary to keep the routes viable for such traffic during all seasons.

Article 9: Route tolls

Each Contracting Party may levy route tolls to defray the costs for maintenance of sections of their roads used for traffic in transit.

Article 10: Construction of new routes and facilities

Should a Contracting Party desire the construction of new routes or route facilities, it shall conclude an agreement for this purpose with the Contracting Party on whose territory the route or facility is to be constructed. The expenses of constructing such new routes and facilities shall be borne by the Contracting Party demanding the construction, unless the Contracting Parties agree otherwise.

Article 11: Protection of the interests of transit States

The Contracting Parties may restrict or prohibit traffic in transit on certain routes, for the duration of repair work or for the duration of a danger to public safety, including traffic safety or public emergency. Before traffic in transit is restricted or prohibited for reasons other than emergencies, Contracting Parties imposing restrictions or prohibitions shall notify the competent authorities of other Contracting Parties well in advance of taking action.

MAIN PARTICULARS OF THE UGANDA RAILWAYS

RAIL-WAGON FERRIES:

Type	Umoja class
Length overall	92.135 m
Length between perpendiculars	86.90 m
Breadth moulded	16.50 m
Depth to main deck	4.30 m
Draft	2.40 m
Speed	13 knots
Machinery	2 four stroke CATERPILLAR engines type D 399-839 kw at 1225 RPM each
Capacity	22 wagons of 56 ton 4 railway tracks or 44 single wagons.
Compliment	44 people (crew + passengers)
Frame spacing	0.61 m
Class	Lloyds Register 100 A 1 "LAKE VICTORIA SERVICE".

Source: Belgian Shipbuilders Corporation V.L.U.

CENTRAL CORRIDOR ROUTES:

The ports of Dar es Salaam and Tanga, both operated by Tanzania Harbours Authority have been designated as outlet seaports on the Central Corridor for Uganda, Rwanda and Burundi traffic. The routes are shown in tables 13 and 14 and illustrated in Figures 1 and 6.

UGANDA TRAFFIC

(1) Kampala - Jinja - Mwanza - Dar es Salaam and vice versa (route no.4, tables 13 and 14).

(i) The railway line from Kampala to Jinja ferry terminal (91 km) owned and operated by URC.

(ii) Inland waterways rail-wagon ferry service on Lake Victoria between Jinja and Mwanza (352 km) operated by either URC or TRC.

(iii) The railway line from Mwanza to Dar es Salaam (1229 km) owned and operated by TRC.

(iv) The port of Dar es Salaam.

(2) Kampala - Jinja - Musoma - Tanga and vice versa (route no.5, tables 13 and 14). This is a proposed route subject to construction of a railway line from Musoma on Lake Victoria to join the TRC's Tanga - Arusha line at Moshi. It will be shorter than the other route above by almost 500 km:

(i) Kampala to Jinja (91 km) as above,

(ii) Inland waterways rail-wagon ferry service on Lake Victoria between Jinja and Musoma (235 km) operated by either URC or TRC,

(iii) The proposed railway line from Musoma to Tanga operated by TRC, and

(iv) The port of Tanga.

RWANDA TRAFFIC

(1) Kigali - Bukoba - Musoma - Tanga and vice versa (route no.10 and 11, tables 13 and 14). This is another proposed route subject to construction of rail between Kigali and Bukoba and the Musoma - Tanga rail. This project is being worked out by the Economic Community of the Great Lakes Countries and the Kagera Basin Authority and will consist of:

(i) Kigali to Bukoba by road or rail,

(ii) Bukoba to Musoma (235 km) by inland waterways rail-wagon ferry operated by TRC,

(iii) Musoma to Tanga by rail operated by TRC, and

(iv) The port of Tanga.

BURUNDI TRAFFIC

The shortest and most important route for Burundi is Bujumbura - Kigoma - Dar es Salaam and vice versa (route 17, tables 13 and 14) as follows:

(i) Bujumbura to Kigoma by inland waterways on Lake Tanganyika (175 km) operated by TRC or Arnolac,

(ii) Rail, Kigoma to Dar es Salaam (1255 km) operated by TRC, and

(iii) The port of Dar es Salaam.

RE-LAUNCHING THE KENYA RAILWAYS RAIL-WAGON FERRY "UHURU".

NATIONAL NEWS

Lake cargo steamer is to link up five countries

A CARGO steamer *MV Uhuru* will commence sailing from Kisumu to Kemondo Bay in Tanzania carrying a load of heavy goods vehicles and demonstrate the ease of movement of goods to Bukoba, Kigali, Bujumbura and Zaire.

This was announced by the Permanent Secretary in the Ministry of Transport and Communications, Mr. W. P. Wambura, who said the maiden sail to Kemondo Bay would be flagged off today.

Wambura said this during the official openning of a meeting between Kenya and Tanzania railways authorities and road transit transporters at te Imperial Hotel in Kisumu called to discuss the mode of operation of a resumed lake ferry services between Kisumu and Kemondo Bay.

In a speech read on his behalf by his deputy, Mr. A. M. Shitakha, the permanent Secretary said te meeting was part of the process aimed at maintaining and strengthening regional co-operation in the spirit of good neighbourliness.

Wambura said several meetings had been held in the past among the neighbouring East African states with a view to exploiting the possibilities of introducing emergency transit routes under the existing geo-political situation in the region.

The meeting was attended by delegates from Rwanda, Burundi, Zaire, Tanzania, Uganda, Kenya and European Economic Community.

Kenya Railways urged to start day-time services

By JEREMIAH AURA

THE Nyanza Provincial Commissioner, Mr. Simon Mung'alla, yesterday appealed to the Kenya Railways Corporation to introduce day-time train service, between Kisumu and Mombasa, to ease congestion and promote tourism in the areas.

Addressing a large crowd at the Kisumu pier during the official commissioning of the Kenya owned cargo steamer, "M.V. Uhuru", Mung'alla also appealed to the corporation to purchase new boats for use in Lake Victoria by tourists.

He explained that day-time train services would encourage a large number of tourists to travel between Kisumu and Mombasa as they will be able to view geographical features between the two towns.

Saying many wananchi were using the night passenger train services, Mung'alla observed that there was a perpetual congestion in the trains and said this would be eased by a day-time service.

On the resumption of the lake ferry services between the East African states, Mung'a.. called on businessmen to effectively utilise the facilities to the maximum.

The steamer which had been out of use for the past 11 years following the collapse of the East African Community, yesterday sailed to Kemondo Bay in Tanzania with 15 trucks and trailers loaded with petroleum and general goods destined for Ruanda, Zaire, Tanzania and Burundi.

The steamer departed at exactly 1.20 p.m. with a crew of 56 and about 150 officials from Kenya, Tanzania, Uganda, Zaire and Burundi governments, United Nations, UNDP and Unctad.

At the pier to witness the colourful launching ceremony were ambassadors of the associating countries who together with the Kenya government delegate had earlier signed a joint communique at a Kisumu hotel resolving to establish a coordinating office for the ferry service at Kisumu to cater for all the six countries.

The meeting also agreed on a harmonised tariffs, a round trip charter and requested the road transport operators to avail themselves for the services.

Source: Kenya Times Newspaper 6th and 7th February 1986.

EVALUATION OF ECONOMIC PERFORMANCE OF ONE URC RAIL-WAGON FERRY

To estimate the operational and economic performance of the capacity of each of the three wagon ferries built by Uganda Railways, the following methodology was used.

1. SHIP DATA:
   - Cargo deadweight capacity, 22 wagons of 40 tonne capacity fully loaded.
   - Service speed, 13 knots.
   - Service power, 1678 KW.
   - Specific fuel consumption (SFC), as given by caterpillar D399 Marine Engines, 230.3 grams per KWh.
   - Auxiliary and port fuel consumption, 5% of (SFC).

2. OPERATIONAL DATA:
   - Steaming load factors considered, 100% full, 75% full, and 50% full.
   - Typical round trip steaming distance, 352 km x 2 (Jinja - Mwanza route).
   - Number of ports of call per round trip, one.
   - Days off-hire per annum, 30 days.
   - Average duration (port turn tound time) of each port call considered: 0.25, 0.5, 1 and 2 days

corresponding to 6, 12, 24 and 48 hours in port respectively.

- Lake days = $\frac{\text{round trip distance (km)}}{24 \times \text{speed (knots)} \times 1.853}$

  = 1.218

- Round trips per annum (RTPA)

  = $\frac{335}{\text{lake days + port days}}$

- Cargo carried per annum

  = cargo deadweight x RTPA x load factor.

3. ECONOMIC DATA:

- Owner operated vessel.
- Ship's first cost, US$ 4.5 million.
- Expected life of ship, 20 years.
- Required Rate of Return, 12%.
- Capital Recovery Factor (CR-12-20), 0.125576.
- Fuel cost per tonne, US$ 440.
- Cargo handling charges and port costs have been ignored.

4. TRANSPORTATION COSTS:

All costs have been worked on annual basis in US$.

Total annual costs = capital charges to cover ship acquisition cost

+ annual running costs

+ voyage costs x RTPA.

Capital charges = 0.125576 x 4,500,000

= 565,092 US$.

Annual running costs:

crew expenses, maintenance and repair, insurance, social benefits, overheads

approx. = 418,000 US$.

Annual voyage costs

= fuel cost per round trip x RTPA

$= 1.05 \times KW \times 24 \times \frac{SFC}{10^6} \times$ lake days x fuel cost/tonne x RTPA

$= 1.05 \times 1678 \times 24 \times \frac{230.3}{10^6} \times 1.218 \times 440 \times$ RTPA

= 5219 X RTPA US$.

Transportation cost per tonne

$= \frac{\text{total annual costs}}{\text{cargo carried per annum.}}$

NOTES ON ESTIMATION OF INLAND TRANSPORT USER COSTS ON THE NORTHERN AND CENTRAL CORRIDORS.

(As at December 1985)

1. The sizes of consignments considered for calculating cost per tonne given in tables 13 and 14 were:
   - Containerised coffee, 2 TEU consignment, 16.8 tonne per TEU, value US$ 2800 per tonne, delivered at the port.
   - Bagged coffee, 40 tonne consignment, value US$ 2800 per tonne, delivered at the port.
   - Containerised motor vehicle spares, 2 TEU consignment, 12 tonne per TEU, value US$ 2650 per tonne, landed at the port.
   - Break bulk motor vehicle spares, 24 tonne consignment, value US$ 2650 per tonne landed at the port.

2. Freight tariff by road is based on what the Governments of Burundi and Rwanda had fixed as maximum to be charged by road hauliers:
   - Mombasa to Kigali or Bujumbura, 18,940 Rwandese Francs (US$ 206) for 2 m^3 of cargo or per tonne container load.

   The above rates include the cost of returning the empty container to the original point. But for the graph in Fig.9, only one way tariff per TEU have

been plotted.

Road charges alone average US$ 0.1046 per tonne kilometre moved. Without cost of returning empty container, the average road charges would be US$ 0.0523 per tonne km moved.

3. Rail charges.

Rail charges/tariffs include terminal charges, siding and shunting charges at wagon ferry terminals, wherever applicable.

Published tariffs have been used whenever possible and the following estimations were deduced.

(i) Fixed cost/tonne in US$.

	KR	TRC	URC
Containerised coffee	7.22	8.49	6.19
Bagged coffee	8.13	8.14	5.49
Containerised motor vehicle spares	10.10	11.79	6.76
Break bulk " " "	8.75	11.12	11.42
Average	8.55	9.89	7.47

(ii) Average cost of moving a tonne-km of freight

KR 0.0256 US$

TRC 0.0161 US$

URC 0.0306 US$.

4. Exchange rates used were

US$ 1 = Kenya shillings 16.0

= Tanzania shillings 19.3

= Uganda shillings 420

5. Clearing and forwarding agency fees are 1% of the CIF values at all the three ports.

6. Wharfage at the ports differ. At Mombasa, wharfage is 0.8% of the value for coffee exports and 1% of CIF value for motor vehicle spares imports. At Dar es Salaam and Tanga ports, wharfage is 1.25% of the value for exports and imports.

7. Bond fees are 1% of CIF values at all the three ports.

8. Lake (inland waterways) tariffs:

For marine services on Lake Victoria, both Kenya and Tanzania Railways consider carriage charges on continuous distance through bookings between rail and marine services, except where otherwise stated. When the carriage of goods involves transhipment between rail, road and or inland waterways, Kenya Railways charges US$ 4.4 per tonne at each transhipment point.

Uganda Railways Marine Services tariffs are separate

or different from those charges for rail services. This depends on cargo carried per annum for each ferry and is as shown in Fig.10 and ranges from US$ 0.03215 to US$ 0.09375 per tonne km. The above rates would cover operating and capital charges.

MAIN DISTANCES ON THE NORTHERN AND CENTRAL CORRIDORS:

(in kilometres)

ROAD:

Kampala	-	Mombasa	1149
Kigali	-	Mombasa	1665
Bujumbura	-	Mombasa	1967
Kigali	-	Kampala	509
Kigali	-	Bujumbura	302
Kigali	-	Bukoba	370
Kisumu	-	Mombasa	845
Nairobi	-	Mombasa	500
Mombasa	-	Malaba	934

RAIL:

Kampala	-	Mombasa	1336
Kampala	-	Malaba	255
Malaba	-	Mombasa	1085
Kisumu	-	Mombasa	932
Nairobi	-	Mombasa	534
Kampala	-	Jinja	91
Mwanza	-	Dar es Salaam	1229
Kampala	-	Port Bell	10
Arusha	-	Tanga	396
Kigoma	-	Dar es Salaam	1255

LAKE (INLAND WATERWAYS):

Lake Victoria:

Jinja	- Mwanza	352
Kisumu	- Bukoba (Kemondo Bay)	380
Kisumu	- Jinja	240
Jinja	- Musoma	235
Bukoba	- Musoma	235

Lake Tanganyika:

Bujumbura	- Kigoma	175

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